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OMAHA-COUNCIL BLUFFS SOLID WASTE MANAGEMENT PLAN

Henningson, Durham and Richardson, Incorporated

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Solid Waste Management Plan
Status Report
1969

OMAHA-COUNCIL BLUFFS

SOLID WASTE MANAGEMENT PLAN

Status Report 1969

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1971

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OMAHA-COUNCIL BLUFFS
SOLID WASTE MANAGEMENT PLAN

TO ENCOURAGE SYSTEMATIC PLANNING for better management of the Nation's solid wastes, Congress in the 1965 Solid Waste Disposal Act provided grant monies for the States for solid waste planning.[1] By June 1966, fourteen States had met the stipulations of the Act and were embarked upon the planning process with the help of the Federal funds. Today, almost every State has applied for and received a solid waste planning grant.[2] From each of the grants the Federal government expects two practical results: first, a plan (and report) for the State's management of its solid wastes; second, development of an agency for the managing function.[3]

The present document publishes the Omaha-Council Bluffs interstate plan representing Douglas and Sarky Counties, Nebraska, and Pottawattamie County, Iowa. This was developed by the interstate planning agency under a Federal solid waste management planning grant that went into effect July 1, 1968. The plan reported on here is necessarily based upon existing data, technology, problems, and objectives. But, the planning process is dynamic; future revision is an important part of the process to take account of changing conditions and better data. Moreover, a plan is not an end in itself. Its formulation is the key to action: to legislation, standards, technical assistance, public relations, and enforcement.

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[1] The Solid Waste Disposal Act; Title II of Public Law 89-272, 89th Congress, S. 306, October 20, 1965. Washington, U.S. Government Printing Office, 1966. 5 p.

[2] Toftner, R. O., D. D. Swavely, W. T. Dehn, and B. L. Sweeney, comps. State solid waste planning grants, agencies, and progress--1970. Public Health Service Publication No. 2109. Washington, U.S. Government Printing Office. (In press.)

[3] Toftner, R. O. Developing a state solid waste management plan. Public Health Service Publication No. 2031. Washington, U.S. Government Printing Office, 1970. 50 p.

Besides providing the interstate planning agency with a guide for action, the Omaha-Council Bluffs plan will help to guide regional solid waste planning and subsequent implementation. The plan can also provide support for improved local legislation related to solid waste management.

The plan is designed, therefore, to: (1) begin the planning process; (2) establish policies and procedures to guide the interstate planning agency; (3) guide regional planning; (4) provide a documented base for improved solid waste ordinances and operating regulations. With these objectives in mind, this plan report presents and analyzes pertinent solid waste data, identifies problems indicated by the data, sets objectives that if achieved would solve identified problems, and finally, proposes immediate, intermediate, and long-range measures for achieving objectives. This plan should thus provide the interstate agency with an invaluable management tool with which to begin solving the solid waste problems in the Omaha-Council Bluffs metropolitan area.

--RICHARD D. VAUGHAN
Assistant Surgeon General
Acting Commissioner
Solid Waste Management Office

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The development of this report has been made pleasurable by the cooperation of many persons and organizations that were contacted during the study period.

Especially grateful acknowledgement is rendered to Mr. Victor E. Ziegler, P. E. who is the MAPA Environmental Health Director. His thoughtful comments, particularly during the final editing, were valuable and appreciated.

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TOPICAL SUMMARY

PART ONE - GENERAL

The Study Area consists of all of Pottawattamie County, Iowa and Douglas and Sarpy Counties, Nebraska, an area of slightly more than 1500 square miles, containing a present population of approximately 529,000. By 1995 this population is expected to increase to approximately 767,000.

All existing solid waste disposal facilities open to the public, and disposal facilities used by solid waste collectors collecting from the public were examined and rated. There are 21 of these facilities, seven serve the urban area containing approximately 95% of the population and 14 serve the remaining rural areas or were very small facilities in the urban area.

All of the facilities have some deficiencies, some of which could be corrected, but many of the facilities must be classified as unregulated open burning dumps.

The basic problem in solid waste management is the apathy of the general public, and the unglamorous nature of solid waste disposal. Until recently, few people were concerned with these matters. Except in a few cases, little professional skill has been applied to the storage, collection, transportation and disposal of solid wastes. As a result, the services being offered are often inadequate in scope and execution, and cost more than first class, well organized services.

The technology for storage, collection, transportation, and disposal of solid waste in an efficient, sanitary, nuisance free and economical manner is available and ready for use, when the public demands proper service and governmental officials supply the necessary management.

PART TWO - SURVEY OF SOLID WASTE

Extensive surveys were made to determine the quantity and characteristics of the present and future solid wastes in the Study Area. Included were surveillances of the seven major public disposal facilities, commercial and industrial surveys, and special studies of special wastes. These surveys were analyzed using systems analysis methods, and electronic data processing equipment. As a result, information was obtained describing the wastes as a function of: time and day of delivery, vehicles used for hauling, classification of haulers, political subdivision of the origins, geographic areas of origins, centroids, potential disposal processes, types of wastes by waste classification, volumes and weights of wastes, compaction factors and seasonal variations. The information obtained is presented in graphic and tabular form and was used in developing the recommended facilities.

The 1968 annual volume and weight of materials which should have been disposed of at public facilities was equal to approximately one (1) million cubic yards and and approximately 700,000 tons per year. By 1995 these quantities are expected to increase to 1,600,000 cubic yards and 1,200,000 tons. If accumulated, these quantities would represent a volume equal to approximately 21,000 acre feet and 26 million tons.

In addition to these materials which can be expected to be delivered to public disposal facilities, a very large volume and tonnage of material will continue to be disposed of at private facilities serving the disposal needs of the facility operator.

PART THREE - DISPOSAL FACILITIES

The sanitary landfill method of disposal is recommended for the solid wastes produced in the Study Area. Reasons and conditions favoring this recommendation are:

1. Adequate land is available.
2. The method has been proven satisfactory where properly operated.
3. The method can meet all health and sanitation requirements and be aesthetically pleasing.
4. The method is adaptable to varying quantities and peak or slack rates.
5. The method is the most economical.

Criteria for the selection of general areas for sanitary landfills is presented. The items include:

1. Minimum driving time and distance to site area.
2. Present land use compatible with sanitary landfilling.
3. Accessible to major highways or arterial streets.
4. Economical land costs.
5. General topography, including terrain, ground cover, ground water and major subsurface conditions must be favorable.
6. Suitable earth cover must be available.

Economic comparisons were made of potential site areas and combinations of site areas, through the use of simulation methods, to determine which combination should be recommended. Consideration was given to both the cost of hauling waste products to disposal facilities and the operation of the facilities in determining the total cost to the community.

Four general site areas in the urban area are recommended:

1. Site Area No. 1 - Vicinity of Interstate 80 and Nebraska Highway 50 in Sarpy County.
2. Site Area No. 3 - West of the present Douglas County Sanitary Landfill Site in the general vicinity of 120th & Fort Streets in Douglas County.
3. Site Area No. 5 - Between Lake Manawa and the Missouri River, South of U. S. 275, in Council Bluffs.
4. Site Area No. 7 - North of Dodge Park, near the Missouri River, north of Omaha in Douglas County.

These general site areas, containing a total of approximately 1,000 acres, will be needed to fill the solid waste products expected from the year 1970 to the year 1995.

In addition to the four general areas for sites to serve the urban area, one additional site is recommended to serve eastern Pottawattamie County. The general area for this site is in the vicinity of Hancock, Iowa. To make this single site economical for the small communities and rural population, an organized collection service is recommended.

The cost of the initial capital expenditures for the four urban sites and one rural site, including land, equipment purchase, and initial development, is approximately $2,200,000.

The total cost of operation, including initial capital expenditures plus operation, is approximately $1.40 per ton. This is less than what is currently being spent for some lesser facilities, and estimated to be less than what other inadequate facilities would cost if their operations were brought up to reasonable standards.

PART FOUR - ORGANIZATION FOR SOLID WASTE DISPOSAL

The recommended organizational structure for the disposal of solid waste is a single, non-profit, public agency. This agency would be formed for the purpose of operating and/or managing all public solid waste disposal facilities in the three county MAPA area, as one coordinated activity, in accordance with a Master Plan for area-wide solid waste disposal. It would operate for and on behalf of all of the member municipalities for their mutual benefit.

Each member would agree to the Master Plan and pass any ordinances or regulations necessary to implement the plan and to grant to the agency exclusive operating authority within their jurisdiction.

Fees would be charged at all agency facilities, for disposal services. These fees would be uniform at all facilities, non-discriminating, and adequate in amount to produce the necessary revenue to make the entire disposal operations self-supporting.

The purchase of land, capital improvements to the land and initial complement of equipment would be paid for with the proceeds of revenue bond issues. The user fees would pay for the bond debt service, debt service reserve, operation and maintenance, equipment replacement, site improvements, miscellaneous and incidental expenses, management and overhead.

The agency membership would consist of one representative of each participating city, town, village and county. The agency's policy and governing body would be a Board of Directors consisting of one member from each of the three counties, three additional members representing the small communities in each of the three counties, and one member each from the major cities. Each Board Member would cast one vote for each 50,000 population in the jurisdiction he represented.

An Inter-governmental agreement creating the recommended agency is presented in the report. Also presented are proposed ordinances for the collection and disposal of solid wastes which the various municipalities may find helpful. They contain the essential technical elements for adequate solid waste matters and certain procedural items tailored for a municipality participating in an agency operated solid waste system.

State and Local Legislation is reviewed and recommendations are made to improve the legal basis for solid waste management.

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PART ONE - GENERAL

A. SCOPE. The objective of this study is to make a detailed analysis of solid waste disposal in the Study Area and to make recommendations for the most feasible program of disposal, both for the present and for the foreseeable future.

The principal items of study and recommendation include the following:

1. Determination of present solid waste quantities, characteristics, and origin by performing the following:

   a. Reviewing and analyzing existing records.

   b. Surveying major disposal facilities.

   c. Surveying minor disposal facilities.

   d. Determining major waste categories.

   e. Locating and surveying major waste contributors.

   f. Surveying and studying the effect of backyard incineration on domestic wastes.

   g. Surveying and studying governmental subdivision procedures and wastes.

   h. Determining quantities of special problem wastes.

2. Determination of future quantities of solid waste based on present quantities, land use and population projections to 1995.

3. Determination of centroids of the various solid wastes generated within the Metropolitan Study Area.

4. Feasibility of storage or transfer stations.

5. Study of methods available for solid waste disposal and recommend method of appropriate future solid waste disposal.

6. Study of existing laws regulating solid waste disposal and recommend appropriate legislation.

7. Study of potential financing of recommended solid waste disposal facility.

8. Study of existing administrative procedures and recommend establishment of appropriate solid waste management program.

B. DEFINITION OF TERMS

1. Abandoned Vehicles. Passenger automobiles, trucks and trailers that are no longer useful as such which have been abandoned on streets, highways and other public places.

2. Bulky Waste. Large items of refuse such as appliances, furniture, large auto parts, trees and branches, stumps, and similar large items not easily crushed or reduced in volume using light landfilling equipment.

3. Commercial Waste. All solid waste originating in commercial establishments.

4. Composting. A process for biological decomposition of organic waste in a nuisance-free manner through controlled environment either aerobic or anaerobic, producing a stable residue which may be used as a soil conditioner.

5. Construction and Demolition Wastes. Waste building materials and rubble resulting from construction, remodeling, repair, and demolition operations on houses, commercial buildings, pavements and other structures.

6. Disposal Area. A site, location, tract of land, area, building, structures, or premises used or intended to be used for partial and/or total refuse disposal.

7. Domestic Waste. All types of refuse which normally originate in the residential household or apartment house.

8. Dump, Open. The consolidation of waste from one or more sources at a central out-of-doors disposal area, which has little or no management and which does not conform to the requirements of a landfill or sanitary landfill.

9. Dump, Open Burning. An open dump where burning is permitted in an uncontrolled manner.

10. Dump, Controlled Open Burning. An open dump where burning is controlled by some responsible person. Burning is not confined to an incinerator but is practiced in the open on the ground.

11. Dump, Controlled. See Landfill.

12. Garbage. Garbage is the solid or semi-solid animal and vegetable waste resulting from the handling, preparation, cooking and serving of foods, including cans, bottles and cartons in which it was received and wrappings in which it may be placed for disposal. Garbage does not include commercial and industrial waste from meat packing plants, food processing plants such as canneries and crop wastes from farms, nor market wastes which originate in wholesale and retail stores or markets engaged in the storage, processing and selling of food products.

13. Incineration. The controlled process of burning solid, semi-solid, liquid or gaseous combustible wastes in an enclosed device, producing an inoffensive gas and a sterile residue containing little or no combustible material. The process is used to reduce the volume or weight of waste material or to change the characteristics of hazardous wastes to a safer form.

14. Industrial Waste. All solid waste originating in industrial establishments.

15. Landfill. Same as a sanitary landfill, except, cover material is applied from time to time as required, instead of daily or more frequently. To be acceptable, landfills must be restricted to inert, non-combustible, non-putrescible solid waste materials.

16. On-Site Disposal. The disposal or partial disposal of solid wastes on the premises where it was originated, including incineration or burial.

17. Pollution. The contamination of any air, water or land so as to create a nuisance or render such air, water or land unclean or noxious, or impure so as to be actually or potentially harmful or detrimental or injurious to public health, safety, or welfare, to domestic, commercial, industrial or recreational use, or to livestock, wild animals, birds, fish, or other aquatic life or to plant life.

18. Refuse. Solid waste.

19. Residue. Solid material remaining after burning, including ash, metal, glass, ceramics, plastics, and unburned combustibles.

20. Rubbish. Non-putrescible wastes, such as cardboard, paper, tin cans, wood, glass, bedding, crockery or litter of any kind.

21. Salvage, Auto. A commercial enterprise engaged in the purchase of obsolete or damaged motor vehicles for the removal and resale of usable parts and the reclaiming of valuable metals.

22. Salvage, Metal. A commercial enterprise engaged in the purchase of salvaged metals for resale, or processing and resale of these metals to metal consuming industry.

23. Salvaging. The controlled removal of reusable materials. Not to be confused with scavenging.

24. Sanitary Landfill. A controlled method of disposing of refuse on land without creating air, land or water pollution or nuisances or hazards to public health or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical volume, and to cover it with a layer of earth at the conclusion of eacy day's operation, or at such more frequent intervals as may be necessary.

25. Scavenging. The uncontrolled picking of materials. Not to be confused with salvaging.

26. Street Refuse. Material picked up by manual and mechanical sweeping of streets and sidewalks, litter from public receptacles, and dirt removed from catch basins.

27. Special Wastes. Hazardous wastes by reason of their pathological, explosive, radioactive, or toxic nature; or wastes which require special treatment prior to disposal in ordinary disposal facilities, or special facilities.

28. Solid Waste. Waste is unwanted or discarded materials resulting from commercial, industrial and agricultural operations and normal community activities. Wastes include solids, liquids and gases. Wastes which are solid or semi-solid containing insufficient liquid to be free-flowing are classed as solid waste.

Solid waste is refuse and includes in part the following: garbage; rubbish; ashes and other residue after burning; street refuse; dead animals; animal waste; abandoned vehicles; agricultural, commercial and industrial waste; construction and demolition waste; sewage treatment residue.

29. Yard Rubbish. Prumings, grass clippings, weeds, leaves, and general yard and garden wastes.

C. DESCRIPTION OF STUDY AREA

1. General. The Study Area as established for purposes of this report includes all of the Standard Metropolitan Statistical Area which includes the counties of Douglas and Sarpy in Nebraska and the County of Pottawattamie in Iowa. Basically, the Study Area comprises approximately 1,530 square miles encompassing the Major Metropolitan Areas of Omaha, Bellevue, and Council Bluffs as shown in Figure I-1. Specifically, the Study Area includes the following Governmental Jurisdiction or Political Units:

Douglas County:

Bennington, Boys Town, Elk City, Elkhorn, Irvington, Millard, Omaha, Ralston, Valley, Waterloo.

Sarpy County:

Bellevue, Chalco, Gretna, LaPlatte, LaVista, Meadow, Melia, Offutt, Papillion, Springfield.

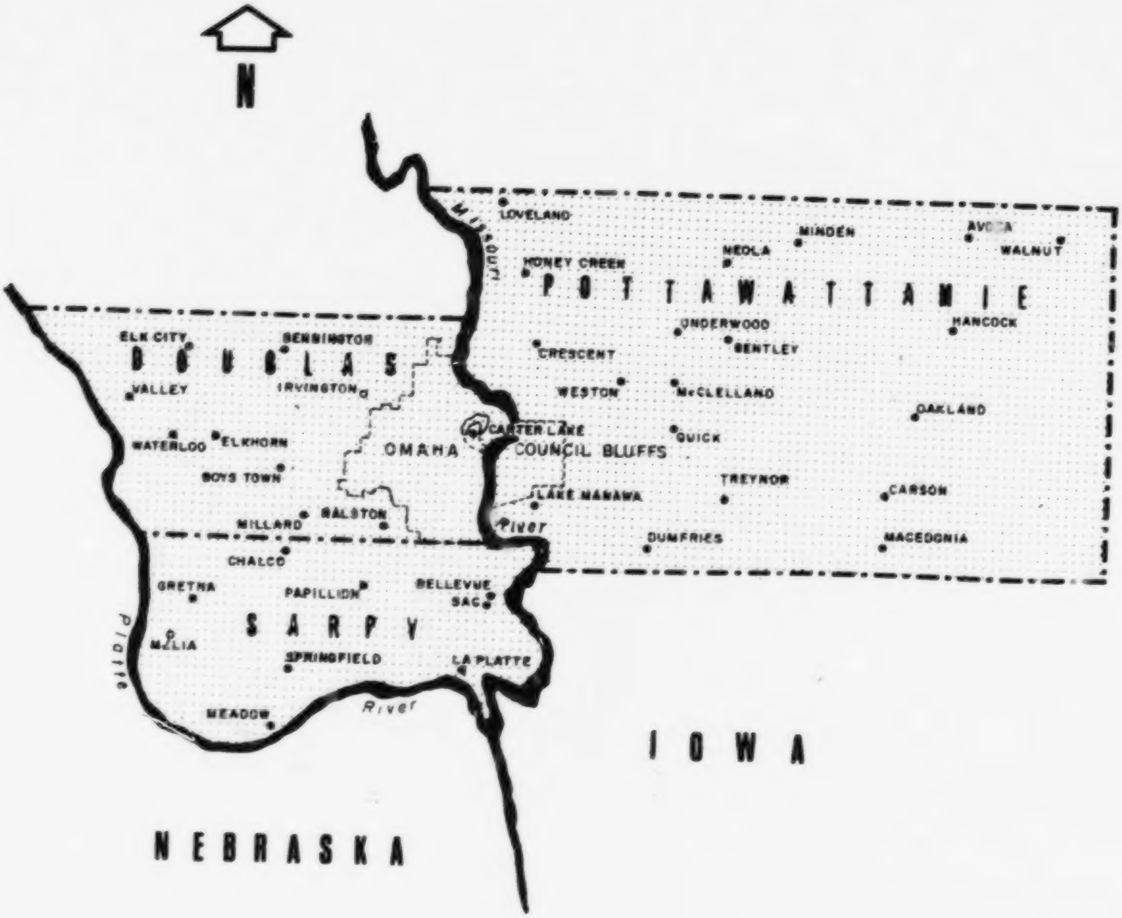
Pottawattamie County:

Avoca, Bentley, Carson, Carter Lake, Council Bluffs, Crescent, Dumfries, Hancock, Honey Creek, Loveland, Macedonia, McClelland, Minden, Neola, Oakland, Quick, Treynor, Underwood, Walnut, Weston.

Omaha, the principal city in the Study Area and largest city in the State of Nebraska, is predominantly a trade, service and processing center for the surrounding agricultural region. In general, the Study Area is served by Interstate Highways I-29 and I-80, numerous other State and Federal Highways, and major air line and rail transportation systems which provide over-night access to Chicago, Denver, St. Louis, Minneapolis/St. Paul and Kansas City.

The Study Area economy has been expanded and strengthened in recent years as a result of several developments including the expansion of headquarters office operations in the insurance and utility fields, the expansion of governmental activities - particularly the Strategic Air Command and recent acquisition of new industries.

The Study Area is located near the geographic center of the United States and has grown and prospered as a result of this advantageous location. Additional impetus to the growing communities within the Study Area were furnished by the rapid mechanization of agriculture and the rise of the cattle industry. This agricultural base created the stockyards, grain markets, and food processing industries which are an important segment of the Study Area economy.


N
Missouri
LOVELAND
MINDEN
AVOCA
WALNUT
NEOLA
HONEY CREEK
POTTAWATTAMIE
HANCOCK
UNDERWOOD
BENTLEY
CRESCENT
ELK CITY
BENNINGTON
DOUGLAS
VALLEY
IRVINGTON
WESTON
McCLELLAND
OAKLAND
CARTER LAKE
QUICK
WATERLOO
ELKHORN
OMAHA
COUNCIL BLUFFS
BOYS TOWN
TREYNOR
CARSON
LAKE MANAWA
RALSTON
MILLARD
River
DUMFRIES
MACEDONIA
CHALCO
GRETNA
PAPILLION
BELLEVUE
SAC
SARPY
Platte
MELIA
SPRINGFIELD
LA PLATTE
MEADOW
River
IOWA
NEBRASKA

METROPOLITAN
SOLID WASTE STUDY AREA

FIGURE I-1

This area does not depend solely on agricultural production, but enjoys broad diversification of its economic base; with other activities such as manufacturing, transportation, communication, services, wholesale trade and insurance facilities being of almost equal importance. Basic employment therefore is diversified among the various economic activities with no single unit overbalancing the others, giving a sound basis for all economic activities.

Judging from the population studies, the basic employment studies and the distribution of employment among the industries, it appears inevitable that there will be marked growth in the manufacturing field. The trend toward steady, constant growth rather than periodic spurts of growth should produce a consistent overall development in all phases of the economic base.

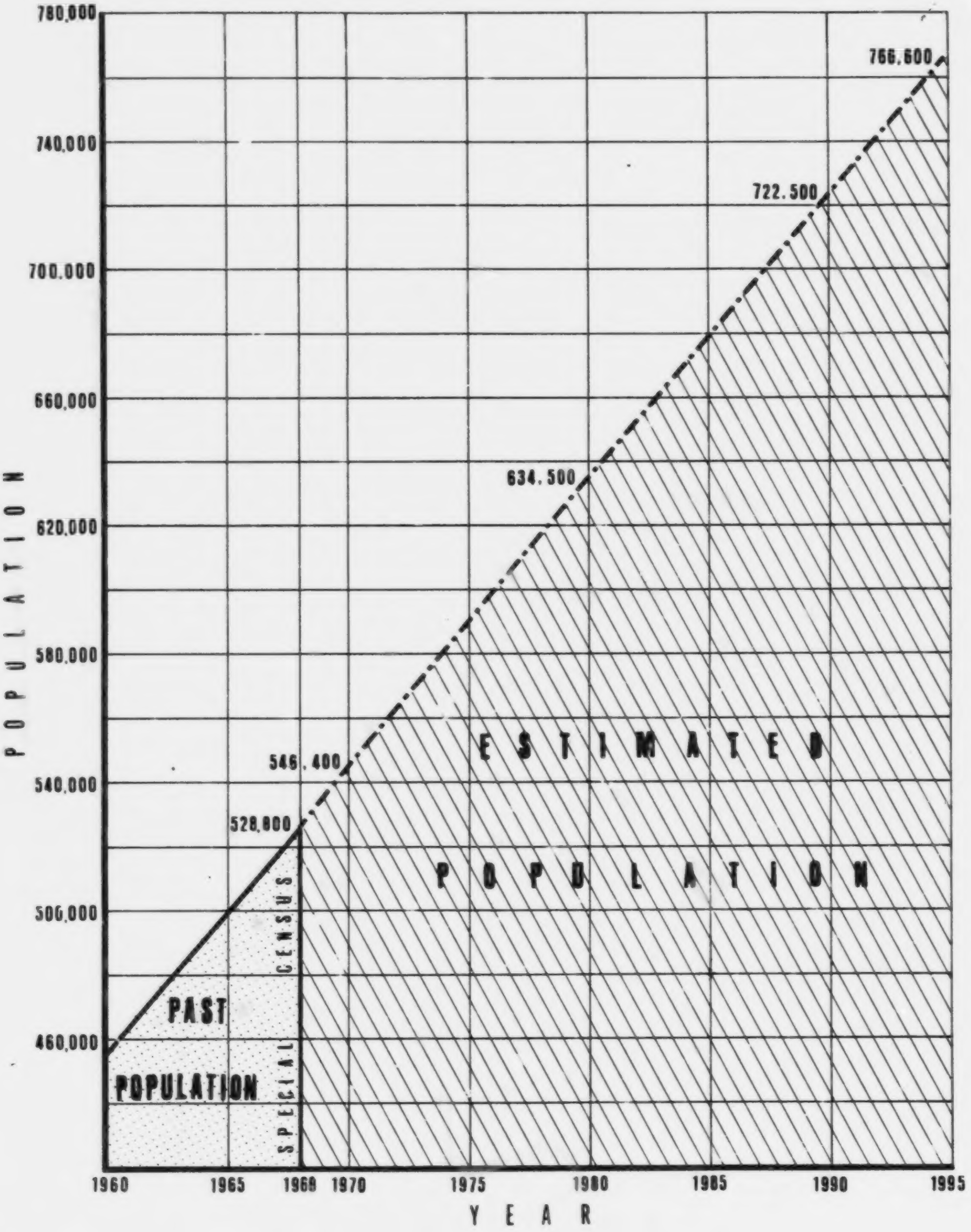
The geographic location should continue to be a tremendous advantage, provided the communities in the Study Area continue to capitalize on the transcontinental interstate highway program and the federal airways and air terminal programs.

The climate of the Study Area is marked by seasonal variations in temperature and precipitation. The average annual temperature is a comfortable 51.1 degrees. Mid-summer average daytime temperatures range from 85 to 87 degrees. Daytime winter temperatures average from 31 to 32 degrees, with nighttime winter temperatures averaging from 15 to 19 degrees. Humidity ranges from 55 to 60 percent from noon to midnight, and 75 percent to 80 percent from midnight to noon. The average normal precipitation is 28.83 inches, 75 percent of which falls between April and September. The average normal snowfall is 28.50 inches. Northwest winds predominate during the winter months whereas, the summer winds prevail from the south and southeast.

The Standard Metropolitan Area utilities followed the national pattern of steady growth since 1960. Electric sales were up 59% over 1960; gas usage increased by 34% and telephones in use and water pumped showed similar increase.

2. Population. An analysis of the past, present and future population trends of a community are a necessary prerequisite to planning future solid waste facilities. The quantity, type and volume of solid waste that is generated, and for which provisions for disposal must be made, are related to the population and the associated commerce and industry, which support the population.

The population projections for the Study Area from 1960 to 1995 were developed by the Omaha-Council Bluffs MAPA and furnished for use in this study. These figures show a steady increase from 458,000 in 1960 to 766,600 in 1995, which is equal to an average annual increase of 8,807 persons or 1.9% per year, based on 1960. See Figure I-2 for Population Trends.



POPULATION TRENDS

FIGURE I-2

3. Land Use. Table I-1 indicates present land use (by acres) for the Study Area. It should be emphasized that the land uses as shown are general in nature and are intended to represent major generators of solid waste, for which collection and disposal programs must be provided. Detailed present and future land use studies were conducted by the Omaha-Council Bluffs Metropolitan Area Planning Agency and furnished for use in this report. The base map used in Figure III-3 indicates the generalized land use projections for the Study Area by 1995. The land use patterns shown represent the major concentrations of residential, commerce and industry development which are expected to have a measurable effect on the size and location of future solid waste disposal facilities.

D. EXISTING SOLID WASTE FACILITIES

1. Name and Location. Twenty-one major and minor disposal facilities in the Study Area were located and surveyed. These facilities were selected because they received material from one or more of the following sources:

a. Public collectors of solid waste.

b. Private collectors of solid waste.

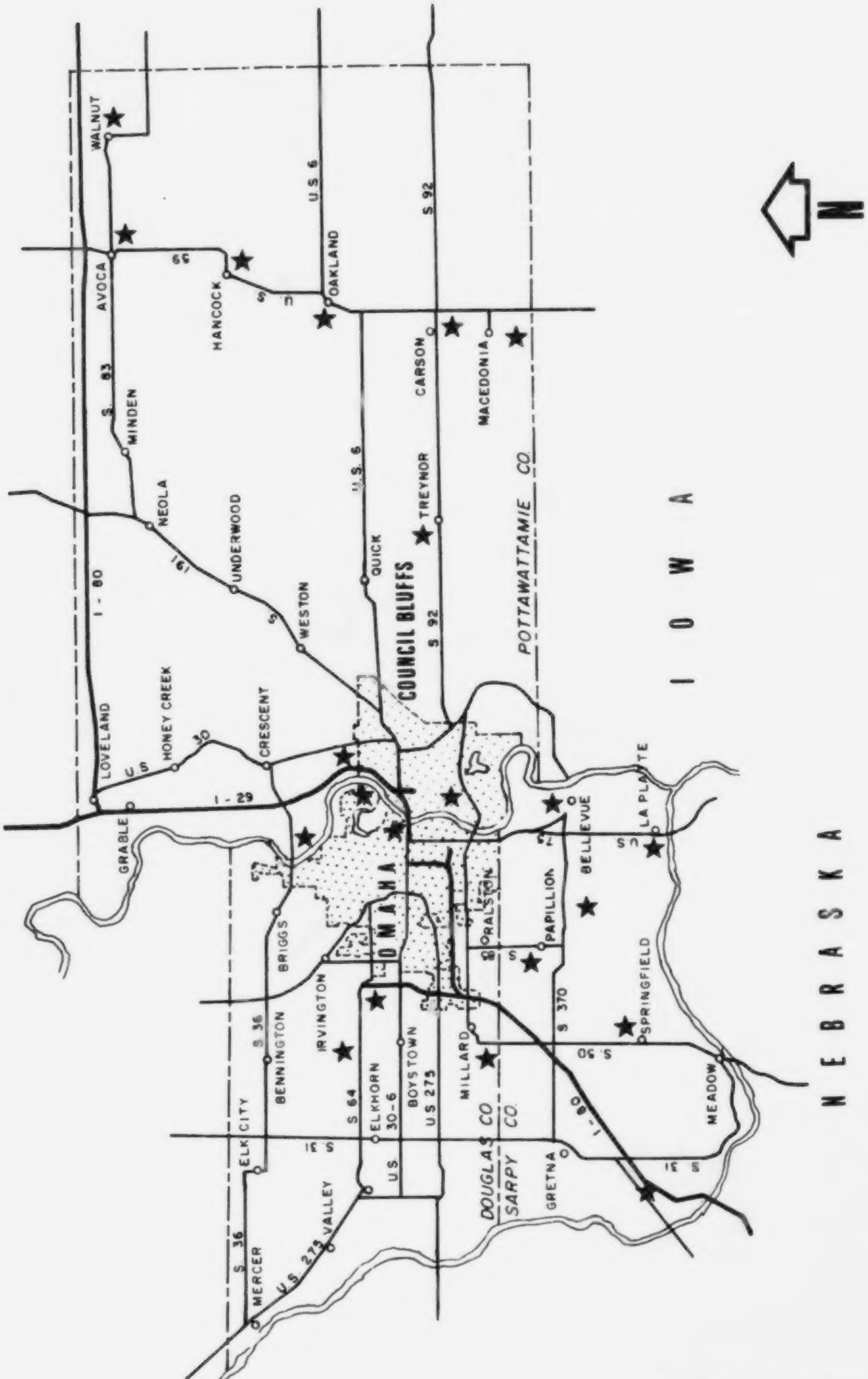
c. General public, including the domestic, commercial and industrial segments.

Not included were strictly private disposal facilities operated for the exclusive use of one or more industries or commercial establishments. These private facilities were included in other surveys described in Part II.

The name and location of the facilities surveyed are listed below and shown in Figure I-3.

Douglas County

Name	Location
Omaha Municipal Incinerator	601 Seward Street
Douglas County Sanitary Landfill	108 and Maple Street
Douglas County Tree Disposal	140 and Fort Street
Omaha City Landfill	34th and Wood Avenue
Millard Dump	North of 156th and Harrison Street


N
WALNUT
AVOCA
HANCOCK
OAKLAND
U.S. 6
S 92
59
S 83
MINDEN
NEOLA
161
UNDERWOOD
WESTON
QUICK
COUNCIL BLUFFS
TREYNOR
CARSON
MACEDONIA
POTTAWATTAMIE CO
I O W A
N E B R A S K A
I - 80
LOVELAND
HONEY CREEK
CRESCENT
U.S. 30
I - 29
GRABLE
OMAHA
BELLEVUE
LA PLATTE
PAPILLION
RALSTON
SPRINGFIELD
MEADOW
BRIGGS
IRVINGTON
BENNINGTON
S 36
ELK CITY
ELKHORN
U.S. 30-6
BOYS TOWN
US 275
MILLARD
DOUGLAS CO
SARPY CO
GRETNA
S 370
S 50
S 31
S 64
VALLEY
MERCER

EXISTING
DISPOSAL SITES

FIGURE I-3

TABLE I-1 - EXISTING LAND USE (Acres)

City	Residential	Commercial	Industrial	Public & Semi-Public	Parks and Recreation	Total Development	Vacant	Total
Douglas County								
Omaha	21,939	3,930	4,948	6,878	2,730	40,425	4,375	44,800
Ralston	306	15	15	102	26	464	410	874
Millard	372	69	116	321	26	904	2,901	3,805
Boys Town	7	--	--	678	--	685	1,354	2,039
Bennington	64	7	19	41	1	132	116	248
Elkhorn	64	7	10	97	2	180	66	246
Valley	152	20	83	38	7	300	316	616
Waterloo	66	8	4	29	1	108	40	148
Total Cities	22,970	4,056	5,195	8,184	2,793	43,198	9,578	52,776
Rural	20,097	118	980	1,063	933	23,191	138,241	161,432
Total Land	43,067	4,174	6,175	9,247	3,726	66,389	147,819	214,208
Total Water								4,032
Total								218,240
Sarpy County								
Bellevue	1,443	153	65	214	72	1,947	567	2,514
Papillion	398	17	8	53	26	502	107	609
LaVista	287	6	25	211	19	548	41	589
Gretna	127	11	8	3	--	149	65	214
Springfield	70	13	15	7	--	105	65	170
Offutt AFB	--	--	--	1,907	--	1,907	--	1,907
Capehart	367	--	--	--	--	367	--	367
Total Cities	2,692	200	121	2,395	117	5,525	845	6,370
Rural	782	28	1,770	1,677	1,455	5,712	140,622	146,334
Total Land	3,474	228	1,891	4,072	1,572	11,237	141,467	152,704
Total Water								6,016
Total Land & Water								158,720
Pottawattamie County								
Council Bluffs	5,088	745	1,245	636	169	7,883	4,230	12,113
Avoca	227	46	6	20	29	328	678	1,006
Carson	117	4	7	8	11	147	103	250
Carter Lake	420	30	87	152	--	689	687	1,376
Crescent	68	7	--	7	6	88	534	622
Hancock	43	12	14	4	129	202	218	420
Macedonia	54	6	4	7	3	74	55	129
McClelland	41	6	7	1	2	57	65	122
Minden	48	10	2	10	--	70	91	161
Neola	98	12	13	8	3	134	188	322
Oakland	205	20	18	19	39	301	499	800
Treynor	70	13	3	6	78	170	52	222
Underwood	57	9	2	10	1	79	200	279
Walnut	129	16	5	4	--	154	263	417
Rural Non-Farm	350	137	287	4,544	2,012	7,330	566,398	573,728
C. B. Planning Area	2,524	653	804	1,110	125	5,216	19,267	24,481
Total Land	9,539	1,726	2,503	6,545	2,607	22,920	593,528	616,448
Total Water								3,712
Total Land & Water								620,160

Sarpy County

Name	Location
Sarpy County Sanitary Landfill	1 Mile West of 36th and Capehart Road
Bellevue Landfill	10th and Warren Street
S & L Landfill	2 Miles West of LaPlatte & Highway #73
Papillion Dump	1 Mile West of 6th and Washington Street
Gretna Dump	3 Miles Southwest of Gretna on Highway #6
Springfield Dump	1/2 Mile Northeast of Springfield

Pottawattamie County

Meese Sanitary Landfill	1 Mile East of Mormon Bridge on Highway #36
Council Bluffs Landfill	3200 South 16th Avenue
Council Bluffs City Dump	1 Mile North of Council Bluffs on North 15th Street
Avoca Dump	2 Blocks Siutheast of Chestnut and Ellsworth Street
Carson Dump	1/4 Mile West of Carson on Highway #92
Hancock Dump	2 Miles South of Hancock
Macedonia Dump	1 Mile South of Macedonia on County M-21
Oakland Dump	2 Blocks South of Brown Street and Highway #59
Treynor Dump	1/2 Mile North of Treynor on County L-55
Walnut Dump	3 Blocks Southeast of Walnut

2. Survey of Existing Facilities. Detailed information pertaining to each of the existing solid waste disposal facilities, with the exception of the Omaha Municipal Incinerator, was compiled using Land Disposal Site Investigation Report forms developed by the U.S. Public Health Service. A sample of this form is included in the Appendix as Exhibit I-1. The Omaha Municipal Incinerator, which was once a major facility, ceased operations during the study and was converted into a transfer station.

A recap of the survey data for each of the disposal facilities is shown in Table I-2, Pages 1 and 2.

The Solid Waste Training Section, Training Program, National Center for Urban and Industrial Health, Cincinnati, Ohio, has developed a tentative rating method for sanitary landfill operations. (During the period this study and report were conducted and after the existing facilities were surveyed, the rating method was slightly changed in a few items. The rating method used in this report is that which was current at the time of the survey.) This rating method contains the essential elements to indicate the quality of sanitation which landfills must maintain in order to operate in three principle types of areas. In many situations, sanitary landfills may attain a rating appropriate for the area in which they are located, through modifications to acquire adequate scores on specific items.

TABLE NO I-2
Page 1

STUDY AREA
MAJOR* & MINOR PUBLIC DISPOSAL FACILITIES

DESCRIPTION	ITEM NO.	DOUGLAS CO SANITARY LANDFILL *	OMAHA CITY DUMP *	DOUGLAS CO TREE DISPOSAL	MILLARD DUMP	SARPY CO SANITARY LANDFILL *	BELLEVUE LANDFILL	S & L LANDFILL	GRETNA DUMP	PAPILLION DUMP	SPRINGFIELD DUMP	MEESE SANITARY LANDFILL *	COUNCIL BLUFFS LANDFILL *	COUNCIL BLUFFS CITY DUMP *	TREYNOR DUMP	WALNUT DUMP	AVOCA DUMP	CARSON DUMP	HANCOCK DUMP	MACEDONIA DUMP	OAKLAND DUMP
SITE OPERATED BY	11	PRIV. AGEN.	PUBL. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PUBL. AGEN.	PUBL. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PUBL. AGEN.	PRIV. AGEN.	PUBL. AGEN.	PUBL. AGEN.	PUBL. AGEN.	PUBL. AGEN.	PUBL. AGEN.	PUBL. AGEN.	PUBL. AGEN.
SITE OWNED BY	12	PUBL. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PRIV. AGEN.	PUBL. AGEN.	PUBL. AGEN.	PRIV. AGEN.	PUBL. AGEN.	PRIV. AGEN.	PUBL. AGEN.	PUBL. AGEN.	PUBL. AGEN.	PUBL. AGEN.
REGULATED BY HEALTH AUTHORITY	13	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
LEVEL OF HEALTH AUTHORITY		COUNTY	COMMUNITY	COUNTY	COUNTY	STATE	COUNTY	COUNTY	COMMUNITY	COUNTY	STATE	STATE	COMMUNITY	COMMUNITY	STATE	STATE	STATE	STATE	STATE	STATE	STATE
GENERAL CHARACTER OF SITE	14	HILLSIDE	LEVEL	GULLY	HILLSIDE	GULLY	GULLY	GULLY	HILLSIDE	FLOOD PLAIN	FLOOD PLAIN	FLOOD PLAIN	FLOOD PLAIN	FLOOD PLAIN	GULLY	OTHER	FLOOD PLAIN	FLOOD PLAIN	GULLY	FLOOD PLAIN	LEVEL
YEAR SITE PLACED IN OPERATION	15	1967	1968	1962	1962	1966	1946	1964	1958	1957	1965	1966	1943	1963	1930	1964	1963	1930	1925	1952	1954
ANTICIPATED LIFE REMAINING (YRS.)	16	3	½	5	1	1	30	15	15	10	2	3	10	15	15	4	5	10	15	15	2
TOTAL AREA OF SITE (ACRES)	17	67	3	30	2	10	90	61	3	8	2	781	38	58	5	1	5	6	3	8	6
ACRES TO BE USED FOR LAND DISPOSAL	18	53	2	25	2	8	10	13	2	6	2	375	37	45	3	1	4	3	2	6	5
ZONING	19	AG.	INDUST.	AG.	AG.	AG.	AG.	RES.	AG.	COMM'L.	RES.	INDUST.	INDUST.	NONE	AG.	AG.	NONE	NONE	NONE	AG.	COMM'L.
LAND USE	19	AG.	INDUST.	AG.	AG.	AG.	AG.	AG.	AG.	COMM'L.	AG.	AG.	INDUST.	AG.	AG.	AG.	AG.	AG.	AG.	AG.	COMM'L.
PLANNED USE OF COMPLETED SITE	20	YES	NO	NO	YES	YES	YES	NO	NO	NO	YES	YES	NO	YES	YES	NO	YES	NO	NO	NO	NO
WILL PUBLIC AGENCY CONTROL SITE USE	21	YES	YES	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO	YES	YES	YES	NO
MATERIAL USED FOR COVER	22	DIRT	DIRT	ASHES	DIRT	DIRT	DIRT	DIRT	DIRT	DIRT	DIRT	DIRT	DIRT	DIRT	DIRT	DIRT	DIRT	NONE	DIRT	NONE	DIRT
FREQUENCY OF COVER	23	DAILY	DAILY	OTHER	OTHER	DAILY	DAILY	DAILY	OTHER	OTHER	OTHER	DAILY	OTHER	OTHER	OTHER	OTHER	OTHER	NONE	OTHER	NONE	OTHER
SPREAD AND COMPACT REFUSE - 2' LAYERS	24	YES	YES	NO	NO	YES	YES	YES	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO
DAYS/YEAR SITE CLOSED (WEATHER)	25	0	0	0	20	1	0	7	53	0	0	0	0	0	25	0	5	0	15	15	14
APPEARANCE	26	SIGHTLY	SIGHTLY	UNSIGHTLY	UNSIGHTLY	SIGHTLY	UNSIGHTLY	SIGHTLY	UNSIGHTLY	UNSIGHTLY	UNSIGHTLY	SIGHTLY	UNSIGHTLY	UNSIGHTLY	UNSIGHTLY	UNSIGHTLY	UNSIGHTLY	UNSIGHTLY	UNSIGHTLY	UNSIGHTLY	UNSIGHTLY
BLOWING PAPER CONTROLLED	26	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES	NO	NO	NO	NO	YES
BLOWING PAPER A NUISANCE	26	YES	NO	NO	YES	NO	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
ROUTINE BURNING	26	NO	NO	P & L	UNCON.	NO	P & L	P & L	P & L	P & L	P & L	NO	NO	P & L	P & L	P & L	P & L	P & L	UNCON.	P & L	UNCON.
SURFACE DRAINAGE PROBLEMS	26	NO	YES	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES	NO	NO	YES	YES	NO	NO	YES
LEACHING PROBLEMS	26	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO
RODENT CONTROL NEEDED	27	YES	NO	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
RODENT CONTROL PROVIDED	27	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	YES	YES	YES	NO	YES	NO	YES
FLY CONTROL NEEDED	27	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
FLY CONTROL PROVIDED	27	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	YES	NO	YES	NO	NO
BIRD CONTROL NEEDED	27	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BIRD CONTROL PROVIDED	27	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
DUST CONTROL NEEDED	27	YES	YES	NO	NO	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
DUST CONTROL PROVIDED	27	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
ODOR CONTROL NEEDED	27	YES	YES	NO	NO	YES	YES	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO
ODOR CONTROL PROVIDED	27	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO
LOWEST PART OF FILL IN WATER TABLE	28	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO
FIRE PROTECTION	29	FIREBREAK	FIREBREAK	NONE	NONE	FIREBREAK	NONE	FIREBREAK	NONE	NONE	NONE	FIREBREAK	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
FIRES EXTINGUISHED ON SITE	30	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	1	0	1	0
SALVAGING PERMITTED	31	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	NO
SALVAGING PRACTICED	32	NO	NO	NO	YES	NO	YES	YES	NO	NO	NO	NO	NO	YES	NO	NO	YES	YES	YES	YES	YES
QUANTITATIVE RECORDS KEPT	34	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO

ABBREVIATIONS: PRIV-PRIVATE, PUBL-PUBLIC, AGEN-AGENCY, UNCON-UNCONTROLLED, P & L-PLANNED AND LIMITED, AG-AGRICULTURE, INDUST-INDUSTRIAL, RES-RESIDENTIAL, COMM'L-COMMERCIAL

TABLE NO I-2
Page 2

STUDY AREA
MAJOR* & MINOR PUBLIC DISPOSAL FACILITIES

DESCRIPTION	ITEM NO.	DOUGLAS CO SANITARY LANDFILL*	OMAHA CITY DUMP*	DOUGLAS CO TREE DISPOSAL	MILLARD DUMP	SARPY CO SANITARY LANDFILL*	BELLEVUE LANDFILL	S & L LANDFILL	GRETNA DUMP	PAPILLION DUMP	SPRINGFIELD DUMP	MEESE SANITARY LANDFILL*	COUNCIL BLUFFS LANDFILL*	COUNCIL BLUFFS CITY DUMP*	TREYNOR DUMP	WALNUT DUMP	AVOCA DUMP	CARSON DUMP	HANCOCK DUMP	MACEDONIA DUMP	OAKLAND DUMP
TONS WEIGHED (ANNUALLY)	35	143,500	0	0	0	24,400	0	0	0	0	0	190,000	0	0	0	0	0	0	0	0	0
TONS ESTIMATED (ANNUALLY)	35	0	86,000	5,000	7,000	0	10,600	4,600	400	1,300	300	0	46,600	85,000	130	370	760	290	130	140	680
ESTIMATED LOADS DEPOSITED DAILY	33																				
FROM PUBLIC VEHICLES	33	4	43	5	1	6	1	0	1	0	0	13	21	84	0	0	0	0	0	1	0
FROM PRIVATE VEHICLES	33	58	0	10	4	12	2	10	1	5	1	82	1	60	0	4	3	2	0	0	2
FROM OTHER VEHICLES	33	96	0	4	0	17	6	4	0	0	0	47	12	120	20	0	15	5	6	8	18
SOLID WASTE ACCEPTED AT SITE	36																				
HOUSEHOLD	36	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
COMMERCIAL	36	YES	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
INDUSTRIAL	36	YES	NO	NO	NO	YES	YES	YES	NO	NO	NO	YES	NO	YES	NO	NO	NO	NO	NO	NO	NO
AGRICULTURAL	36	YES	NO	NO	NO	YES	YES	YES	NO	YES	YES	YES	NO	NO	NO	NO	YES	NO	NO	YES	NO
INSTITUTIONAL	36	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO
INCINERATOR RESIDUE ONLY	36	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SOLID WASTE EXCLUDED FROM SITE	37																				
ALL PUTRESCIBLES	37	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
ALL NON-COMBUSTIBLES	37	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO
ALL COMBUSTIBLES	37	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
GARBAGE	37	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO
DEAD ANIMALS	37	NO	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	NO	YES	YES	YES	NO	YES	NO	YES	YES
WASTE OIL	37	NO	YES	NO	YES	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO
SEWAGE SOLIDS	37	NO	YES	YES	YES	NO	YES	NO	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	NO	NO	YES
JUNKED AUTOMOBILES	37	NO	YES	YES	YES	YES	YES	NO	NO	YES	YES*	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
LARGE APPLIANCE	37	NO	YES	YES	YES	NO	NO	NO	NO	NO	NO	NO	YES	NO	YES	YES	NO	NO	NO	NO	NO
DEMOLITION WASTES	37	NO	NO	YES	YES	NO	NO	NO	NO	YES	NO	NO	YES	NO	YES	YES	NO	NO	NO	NO	NO
CONSTRUCTION DEBRIS	37	NO	YES	NO	YES	NO	NO	NO	NO	YES	YES	NO	YES	NO	YES	YES	NO	NO	NO	NO	NO
STREET,-SWEEPINGS	37	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	YES	NO	YES	YES	NO	NO	NO	NO	NO
TIRES	37	NO	YES	YES	NO	NO	NO	NO	YES	NO	NO	NO	YES	NO	YES	YES	NO	NO	NO	NO	NO
HAZARDOUS MATERIALS	37	NO	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	NO	YES	YES	YES
OTHER	37	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	NO	YES	NO
EQUIPMENT AVAILABLE	38																				
DRAGLINE OR EXCAVATOR	38	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
SCRAPER (SELF PROPELLED)	38	1	1	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
TRACTORS (TRACK OR RUBBER TIRE)	38	2	1	1	0	2	* 1	1	0	0	0	2	1	1	0	0	0	0	0	0	0
TRUCKS	38	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0
EMPLOYEES ON SITE (AVE. DAILY)	39	4	1	1	0	1	2	2	0	0	0	4	1	2	1	1	0	0	0	0	0
NUMBER OF HOURS OPERATED/DAY	40	9	8	9	9	9	9	9	4	8	6	11	9	10	11	3	24	24	24	24	24
NUMBER OF DAYS OPERATED/WEEK	41	SIX	FIVE	SIX	FIVE	SEVEN	SIX	SEVEN	SEVEN	FIVE	TWO	SEVEN	FIVE	SEVEN	TWO	THREE	SEVEN	SEVEN	SEVEN	SEVEN	SEVEN
ANNUAL OPERATING COST	42	80,000	18,000	5,000	1,700	31,000	25,000	8,000	3,000	1,300	1,000	150,000	12,000	15,000	1,200	1,500	500	600	300	1,500	1,600
SANITARY LANDFILL	43	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO

In a sanitary landfill, the sanitary condition of the fill should be maintained at all times; therefore, a high score must be attained and maintained on certain "must" items in order to assure the proper degree of health protection.

A sample of the tentative rating system is reproduced in the Appendix of this report as Exhibit I-2. A summation of the points awarded for each of the twenty-seven items yields a possible score of up to 100. The method used for evaluating the numerical ratings is as follows:

> A-Rated. Sanitary Landfill - Suitable for well developed areas such as residential and commercial zonings. The total rating must equal 85 or more points.
>
> B-Rated. Sanitary Landfill - Suitable for areas of industrial zonings. The total rating must equal 70 or more points.
>
> C-Rated. Sanitary Landfill - Suitable for remote or rural areas. The total rating must equal 55 or more points.

The following items of the tentative rating form must score as indicated in order to qualify for any of the three ratings listed. These items are referred to as "must" items.

	Must Items	A-Rated	B-Rated	C-Rated
Item 9	Blowing Litter	4	2	2
Item 12	Daily Cover	15	10	10
Item 13	Intermediate Cover	3	1	1
Item 14	Final Cover	3	3	3
Item 18	Burning	3	3	1
Item 22	Placement of Ground Water	5	3	3
Item 23	Drainage of Surface Water	6	-	-

Of the twenty (20) major and minor disposal facilities investigated throughout the Study Area, only six (6) had the potential of being called sanitary landfills. Most of the remaining fourteen (14) disposal facilities are entirely inadequate and can be described as open, uncontrolled, burning dumps, since they do not comply with sanitary landfill standards, nor can they qualify for the minimum C-rating of 55 points or more.

The "must" items with which a sanitary landfill must comply have been listed and rated for each landfill operating in the Study Area and are shown in Table I-3 of this report. Of the six landfills listed, three were rated as sanitary landfills; Douglas County SLF, Sarpy County SLF and Meese SLF.

A brief summary of the existing landfills listed in Table I-3 is included in the following paragraphs.

The Douglas County Sanitary Landfill received a total of 79 points for all items listed on the sanitary landfill rating form and qualified for a B-rating, suitable for an area of industrial zoning. Improvement in "must" Item #9, "Blowing Litter", along with improvements in several minor items listed on the sanitary landfill form (access road, etc.) would qualify this site for an "A-rated" sanitary landfill.

The Sarpy County Sanitary Landfill received a total of 79 points for all items listed on the rating form and qualified for a B-rating, suitable for an area of industrial zoning. (Since the time the ratings were made this site has begun a program of controlled burning of tree waste. Under the new rating system, any deliberate burning, regardless of the degree of control, would disqualify a site from receiving any "sanitary" rating.) Improvement in "must" Item #9, "Blowing Litter", along with other minor improvements would qualify this site for an "A-rated" sanitary landfill.

The Meese Sanitary Landfill received a total of 87 points for all items listed on the sanitary landfill rating form which is more than enough for an "A" rating; however, due to "must" Items #9 "Blowing Litter" and #22 "Placement in Ground Water" which were rated "B", this site must be given a "B" rating, suitable for an industrial zoning.

The Bellevue and S & L Landfills each received 53 total points for all items listed on the sanitary landfill rating form but could not be rated as sanitary landfills since both sites deviate materially from "must" Items #9 "Blowing Litter" and #18 "Burning". Improvements such as fencing to control blowing litter and prohibiting open burning are needed, along with other minor site improvements in order to upgrade these sites into C-rated sanitary landfills suitable for rural areas.

The Council Bluffs Landfill received 46 total points for all items listed on the sanitary landfill rating form and could not be rated as a sanitary landfill since this site lacks adequate points and deviates materially from "must" Items #9 "Blowing Litter," and #12 "Daily Cover", and #13 "Intermediate Cover" to qualify for the minimum C-rating of 55 points or more. This landfill is entirely inadequate since sufficient cover material is not available to cover refuse and intermittent contact occurs between refuse and groundwater table. This site does not comply with the essential "must" items to indicate the quality of sanitation which sanitary landfills must maintain.

TABLE NO. I-3

SANITARY LANDFILL "MUST" ITEMS AND RATINGS

ITEM	POINTS POSSIBLE	DOUGLAS CO SANITARY LANDFILL	SARPY CO. SANITARY LANDFILL	BELLEVUE LANDFILL	S & L LANDFILL	MEESE SANITARY LANDFILL	COUNCIL BLUFFS LANDFILL
9 **BLOWING LITTER**							
a. CONTROLLED	4,A						
b. PARTIALLY CONTROLLED	2B,C	2 (B)	2 (B)			2 (B)	
c. UNCONTROLLED	0			0	0		0
12 **DAILY COVER**							
a. WORKABLE SOIL > 6"	20					20 (A)	
b. OTHER SOIL > 6"	15 A	15 (A)	15 (A)	15 (A)	15 (A)		
c. RESIDUE > 6"	10B,C						
d. IMPROPERLY COVERED	0						0
13 **INTERMEDIATE COVER**							
a. WORKABLE SOIL > 12"	4					4 (A)	
b. OTHER SOIL > 12"	3A	3 (A)	3 (A)	3 (A)	3 (A)		
c. RESIDUE > 12"	1 B,C						
d. IMPROPERLY COVERED	0						0
14 **FINAL COVER**							
a. WORKABLE SOIL > 24"	4					4 (A)	
b. OTHER SOIL > 24"	3 A,B,C	3 (A)	3 (A)	3 (A)	3 (A)		3 (A)
c. IMPROPERLY COVERED	0						
18 **BURNING**							
a. NO BURNING	3 A,B	3 (A)				3 (A)	3 (A)
b. CONTROLLED & LIMITED	1 C		1 (C)				
c. UNCONTROLLED	0			0	0		
22 **PLACEMENT IN GROUND WATER**							
a. NO CONTACT	5A	5 (A)	5 (A)	5 (A)	5 (A)		
b. INTERMITTENT CONTACT	3B,C					3 (B)	3 (B)
c. UNCONTROLLED CONTACT	0						
23 **DRAINAGE OF SURFACE WATER**							
a. NO PONDING	6 A	6 (A)	6 (A)			6 (A)	
b. OCCASIONAL PONDING	3B,C			3 (B)	3 (B)		3 (B)
c. UNCONTROLLED	0 B,C						
ALL ITEMS (1-27)							
TOTAL POINTS		79	79	53	53	87	46
RATING		B	B	NONE	NONE	B	NONE

The ratings which were assigned could vary from day to day and from week to week. Generally, the ratings assigned were those observed during the site survey except where there were reasons to believe the conditions at that time were unusual. In which case, other observations were made at other times. These ratings are not official in any way and are included in this report solely for the purpose of indicating the general condition of disposal facilities in the Study Area.

To insure that the appropriate standards, regulations, and laws for the proper operation of a sanitary landfill are complied with, a sanitary landfill site and operation should be inspected at least once a month by the Health Officer, or other public official charged with this responsibility, in whose jurisdiction of the facility is located.

Although the U. S. P. H. S. recognizes the Types B and C sanitary landfill, we have recommended in later parts of this report that all sanitary landfills in the Study Area be constructed, equipped and operated in accordance with the highest type standards. (A rated)

Although the site might be physically located in an area that could be considered rural or industrial at this time, the entire Study Area is part of a growing Metropolitan Area and sanitary land fill sites must be developed with this in mind. The difference between the several rating types is not significant from a cost standpoint. The major difference is operational and managerial. A sanitary landfill as proposed in this report and given proper professional management should have no difficulty passing the highest type rating systems. Recommended standards are included in Part IV of this report.

E. NEED FOR SOLID WASTE MANAGEMENT. Within the past few years, the federal government has made great efforts to organize an attack on solid waste problems. Research and development grants and demonstration grants have been awarded to many organizations and communities to upgrade the general knowledge in this field. Many communities and state governments have passed solid waste control acts to stop the wholesale pollution of water, air and land caused by improper storage collection, transportation and disposal of solid wastes.

The basic issue in solid waste management lies in the apathy of the general public, and the unglamorous nature of solid waste problems. Until recently, few people ever heard of solid waste and fewer had any interest in the matter. Most people thought garbage was the principle substance representing the largest quantity of solid waste; when the "garbage men" took it away the story ended. People are beginning to suspect there is more to the problem. Water and air pollution control are common household words, and improper solid waste management means not only water and air pollution but also land pollution.

Because garbage collection is an unpopular subject, many governmental units give this area little attention. The sanitation departments of many municipalities are operated by senior garbage collectors who have come up through the ranks; although they understand how the garbage cans are to be emptied and trucks are driven, they lack even the fundamental managerial skills necessary to properly spend a large portion of the municipal tax dollar. They are unacquainted with fiscal and personnel management procedures and modern engineering techniques.

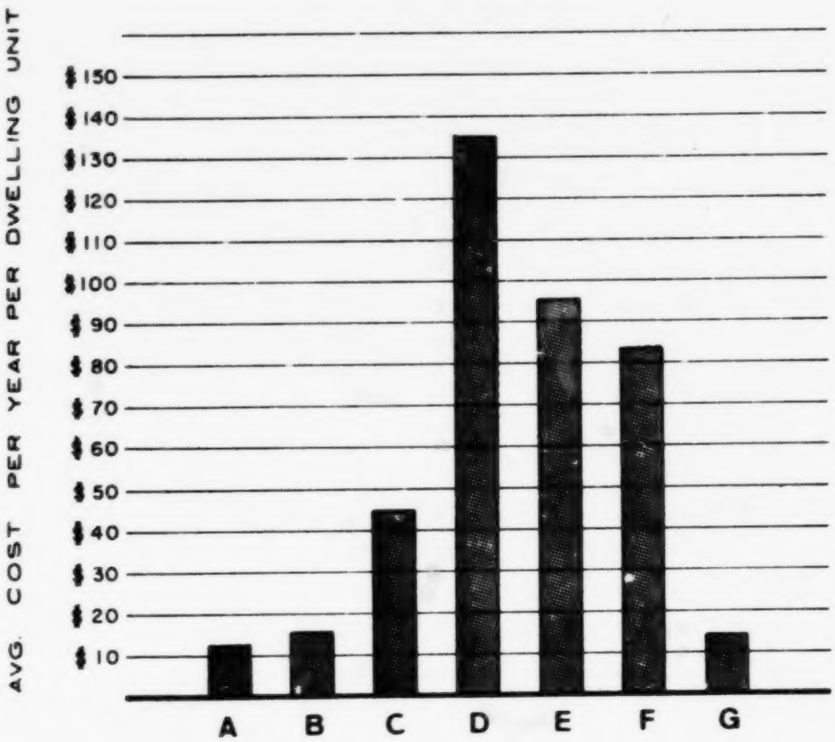
When compared to other services and utilities, the cost of collection and disposal of solid waste is not high. Figure I-4 shows the approximate annual cost per dwelling unit of several common services and utilities. Although the cost per dwelling unit is not great, it still represents a major item in a municipal budget, usually ranking fourth after schools, streets and police and fire protection.

Unfortunately, even when spending too much for benefits received, the level of service and operating techniques are frequently inadequate, antiquated and unsanitary. Improved management can usually improve service and reduce cost.

Civic leaders, both professional and lay, are often uninformed about solid waste management. If the level of knowledge can be raised in government concerning these matters, tax dollars can be saved, services expanded, and sanitary conditions improved. The tax savings and expanded services are important and desirable, but the improvement in sanitary conditions is mandatory if the public safety and welfare are to be preserved.

Improving sanitary conditions through proper solid waste management should be approached in two ways. First, there must be laws which establish minimum standards of practice plus effective enforcement; and secondly, there must be a program of public information showing how solid waste management can be economically pursued.

Solid waste storage, collection, transportation and disposal must be managed as a vital link in the control of water, air and land pollution.



A. *COLLECTION & DISPOSAL OF SOLID WASTES*
B. *SEWER SERVICE (WASTE WATER TREATMENT)*
C. *WATER*
D. *GAS*
E. *ELECTRICAL POWER*
F. *TELEPHONE*
G. *TELEPHONE EXTENSION*

COMPARING SOLID WASTE COLLECTION
& DISPOSAL COST WITH
OTHER SERVICES & UTILITIES

FIGURE I-4

F. PRESENT TECHNOLOGY

1. General. The technology to collect, transport and dispose of solid waste is available for immediate use. New techniques are under investigation and much research and development is being done. Hopefully, some of this work will produce better methods, lower costs and refinements to existing methods. We can also hope that, eventually, processes will be developed which can economically convert our present wastes into useful products to be recycled in the economy.

For the present, the monumental task that must be accomplished is the improvement of many of our existing systems, from their present antiquated status through the use of modern technology which is currently available.

2. Collection Systems. Solid waste collection is a responsibility of the public, along with water supply, sewage disposal, streets, fire and police protection. These services are usually provided by local government, and paid for through taxation or a service charge. It is recognized that a government can provide these necessary services for the public more efficiently and economically than the individual can provide them for himself. Further and specifically in the case of collecting solid waste, if the local governmental unit does not provide for collection services, many citizens do not adequately provide for their own waste disposal. As a result, the entire community suffers.

There are three basic types of collection service, ie. Municipal, Contract and Private.

a. Municipal and Contract Systems. The municipal and contract systems are similar. Both are under the control of the municipality. They operate on established routes serving the entire residential areas on a scheduled basis. Under these systems the community receives regular collection of its domestic waste. The system is planned, organized and supervised by the municipal government. The results are an efficient collection service at a reasonable cost to the community.

The basic difference between the two systems is that the municipal system operates the service using its own manpower, equipment and facilities, whereas the contract system uses the manpower, equipment and facilities of a private contractor to operate the system under an agreement between the contractor and the municipality.

The municipality capable of operating its own system efficiently, usually has a lower unit collection cost than the community contracting with private haulers. The municipality can operate the system without a required profit whereas the private contractor cannot. There are other cost factors in favor of a system owned and operated by a municipal government. Tax savings in the purchase of equipment and supplies and in the operational cost of equipment lower collection costs. A municipally controlled collection system, properly planned and supervised, will provide satisfactory service to the public, whether the system is municipally owned or contracted with a private hauler. The cost to the public is the principal consideration.

b. Private System. With a private system the municipality has a minimum involvement with the collection of waste, usually limited to controlling ordinances and the licensing or franchising of collectors. Some communities do not require any of these items. Private collectors contract directly with the property owner for an agreed fee.

When collections are left entirely to an agreement between the property owner and the private hauler, the service is generally not as efficient as the other systems. The private system places the responsibility for the collection of waste with the individual property owner who may, or may not have a conscientious concern for the problem. Usually several private haulers will compete within a community to provide service. This competition will tend to keep the charges uniform; however, it will prevent any one private collector from establishing an efficient route where he can collect from all property owners in a given area. As a result, the cost to the individual is usually higher than either the municipal or the contract system.

For small communities, the operation of a municipal system may not be economical if only the one community is involved, but several communities may find it economically feasible to join together to operate a municipal type system as a cooperative venture under the existing authority and as proposed in recommended legislation.

Collection systems may collect only domestic waste or may, if desirable, collect domestic, commercial and industrial wastes, or a combination of the several. Frequently municipalities include many commercial establishments in their collection systems, particularly where the waste from these establishments are not large in volume or difficult to handle. This is done as a convenience and may result in a savings to the establishment. Many industrial and some commercial waste producers require special service which a municipality may be unwilling to provide. For this reason most industrial and many commercial establishments either provide their own removal service or engage the services of a private system. There is no technical or financial reason why this service could not also be provided by a municipal system. Each case should be considered on its own merits. Table I-4 shows the type of collection system currently being used in the various communities in the Study Area.

A variety of specialized equipment is available for collection of waste. The most common item is the packer truck, which also comes in a variety of sizes and arrangements. Basically, this is a totally enclosed and watertight body mounted on a truck chassis. It has a device which compacts the loose solid waste into a smaller volume, enabling the truck to carry more material than it could if placed in the body in a loose condition. Many packer trucks can carry three or more times as much material as a non-packer truck of the same size. The advantages of such a truck are particularly significant when long hauls to a disposal site are required. In addition to the economy, the truck is totally enclosed and watertight, providing a significant reduction in litter.

Containers of various types are also available. Some are designed to be left at a customer's premises and when filled are exchanged for an empty container. The filled container is removed to a disposal facility where it is emptied and available for reuse. Some containers are designed to be left at a customer's premises and when filled are simply emptied into a type of packer truck. After emptying several or many containers, the truck is driven to a disposal site for emptying.

The train system is available. This system employs a series of relatively small trailer units pulled by a light-weight truck, along a collection route. From time to time a packer truck fitted with a lifting device, is dispatched to meet the train system. The packer truck lifts each trailer and contents, one at a time, and dumps the contents into the truck. The train then continues collection and the packer truck may either proceed to other train crews or when filled, proceed to the disposal site.

Packer trucks, containers, trains and other systems or devices are available in a variety of sizes, shapes and functional arrangements. The best system, size, shape or arrangement depend on many local factors and must be determined after a careful study. This equipment is available from many manufacturers. The proper application of the proper equipment, together with a carefully planned and operated system, can be very beneficial to a community. A first rate system frequently is less expensive to a community, when the total cost to a community is considered, than a poor system or no system at all.

3. Transportation Systems. Solid waste, when collected, must be transported to a place of final disposal. This is usually accomplished in the vehicle in which it was collected but it may be transferred to a special hauling vehicle suitable for this purpose.

Direct hauling in a collection vehicle presents no special problems and is the most straight forward way of accomplishing the task. There are, however, many factors which must be considered, including in part: the haul distance, in both time and miles; the lost time for crew members, who are not productive when their collection vehicle is hauling; and the size of the pay load for hauling purposes vs. the desirable size of the vehicle while on route. These factors must be weighed against the alternative of transferring the collected load to a special hauling vehicle.

TABLE I-4 -INVENTORY OF COLLECTION PRACTICE

Douglas County

City	System	City	System
Bennington	Private	Millard	Private
Boys Town	Private	Omaha	Muni-Contr.
Elk City	Private	Ralston	Muni-Contr.
Elkhorn	Private	Valley	Private
Irvington	Private	Waterloo	Private

Sarpy County

City	System	City	System
Bellevue	Private	Meadow	Private
Chalco	Private	Melia	Private
Gretna	Private	Offutt	Contract
LaPlatte	Private	Papillion	Private
LaVista	Private	Springfield	Private

Pottawattamie County

City	System	City	System
Avoca	Private	Macedonia	Private
Bentley	Private	McClelland	Private
Carson	Private	Minden	Private
Carter Lake	Private	Neola	Private
Council Bluffs	Municipal	Oakland	Private
Crescent	Private	Quick	Private
Dumfries	Private	Treynor	Private
Hancock	Private	Underwood	Private
Honey Creek	Private	Walnut	Private
Loveland	Private	Weston	Private

The most common form of special hauling is the Transfer Station. A transfer station is a facility, usually centrally located, which is equipped to efficiently receive various loads of waste from collection vehicles or other vehicles and place them in large semi-trailers for hauling to a place of disposal. To be economical, it is necessary that the cost of transfer and haul must be less than the cost of direct haul. Only a careful study of the exact local conditions can determine when a transfer station should be provided.

The knowledge of how to design and operate transfer stations, and all of the necessary equipment is available.

Other forms of transfer or transportation are available or are under study. Some communities use barges while others are using or are planning to use railroad facilities. Studies are under way to investigate the transportation of solid waste in slurry form in pipe lines and in dry form in vacuum pipes. All of these systems are special conditions which may be considered on their own merit.

4. Disposal Systems. Solid waste disposal can be accomplished using any of several methods. The selection of the most appropriate method depends on the particular circumstances that prevail at the time and in the location where the disposal is needed.

The old town dump, where refuse was burned from time to time was once acceptable when there were fewer people, less intense land development and little knowledge of air and land pollution. Today this practice is inappropriate.

In some seacoast communities combustible refuse is burned on barges far out to sea and the residue dumped into the water. This practice is now condemned as a source of air and water pollution.

In the large metropolitan regions such as the New York City area, land, labor and transportation costs present a different set of circumstances than prevail in the Omaha-Council Bluffs Metropolitan Area. Each community or region must consider methods which are based on local conditions.

In the following paragraphs, three basic processes for disposal are discussed: Incineration and landfilling, composting and landfilling, and sanitary landfilling.

a. Incineration and Landfilling. This process consists of two parts; ie. the reduction of volume of combustible materials through the use of an incinerator; and the landfilling of incombustible waste and incinerator residue. Much of the total waste of a community is incombustible and is normally disposed of in a sanitary landfill or some other land disposal process. The combustible waste can be significantly reduced in volume in an incinerator. The residue or ash which remains after incineration can be disposed of in sanitary landfills. The incineration process consists of reducing combustible solid waste to an inert residue by burning, within an enclosure, under high temperatures and controlled conditions. When accomplished in a large facility for a community with waste transported to the facility from several sources it is referred to as Central Incineration. When accomplished by individuals or commercial, industrial or institutional concerns for their own locally generated waste is referred to as On Site Incineration.

Central and On Site Incinerators are used for two purposes; to reduce large volumes of waste to a small volume of residue and to change the form of a material which may be dangerous or a nuisance to one which is safe or nuisance free.

Municipal **incineration** plants are familiar to the general public. Unfortunately many poor examples are in existence today. They should not be considered as typical of what a modern plant can be. The modern plant with proper air pollution control devices, burning at high temperatures and equipped with proper controls and site facilities can be operated in any area zoned for industrial use without creating a nuisance.

There are some incinerators in the United States which are fine examples of industrial architecture. Much of the public would be unaware of the function of the facility if it were not for signs on the building or at the gates.

A major advantage of the central incinerator is the relatively small land requirement and the ability to locate the plant in an industrial area within a city. The central location reduces the hauling cost not only for the city collection crews, but also for the industrial and commercial users of the facility. This advantage is particularly important in large metropolitan areas where there is a high cost in hauling materials from the place where the waste is generated, to landfill sites in rural areas. It is not as important in any location where rural land is available within a few minutes driving time from the center of the City.

It was found that in this metropolitan area under the present circumstances, incineration is not practical due to reasonably close potential landfill sites.

The major disadvantage is the cost of initial construction and the cost of maintenance and operation. These costs usually range upward from $7.00 per ton of waste delivered.

Modern incinerators generate considerable amounts of waste heat. In some new plants heat is now being put to economical use as steam which is either used for generation of electricity or used directly as steam or hot water in a variety of processes. The steam or electricity thus produced is sold to offset part of the cost of operation. The first cost is higher but frequently it is a worthwhile investment.

Formerly excess air was introduced into incinerators to reduce the temperature of the stack gases. With increasing air pollution requirements the cost of scrubbing these excess air quantities is greatly increased. The recovery of excess heat in the form of steam not only produces a valuable by-product, but also reduces the required quantity of excess air which in turn reduces the cost of scrubbing the stack gases.

Certain industries, commercial establishments and institutions may wish to operate on-site incinerators as a matter of convenience. If they are properly designed and operated they should be permitted. The design, however, must include all of the necessary controls and devices to insure proper burning and safety and air pollution controls.

Some on-site incinerators may be necessary. For example, the safe disposal of infectious or otherwise contaminated materials from hospitals or drug manufacturers requires incineration. Also highly volatile and inflammable liquids from other industries cannot be safely buried in a landfill. In these cases, incineration is necessary and an acceptable method of disposal; however, they should be licensed and controlled.

In the event a community or industry would find it to their advantage to construct and operate an incineration facility, the technology and equipment is available to accomplish the task without pollution to the water, air and land of the community.

b. Composting and Landfilling. This process consists of two points; ie. the conversion of the organic portion of solid waste to compost referred to as "composting"; and the landfilling of the non-compostable material. Composting is the conversion of the organic portion of the solid waste through aerobic digestion, to a stable and harmless material, which may be used for a soil conditioner.

Micro-organisms which are present in garbage and other organic material will cause the waste to decompose. The composting plant provides the proper environment for these organisms. The plant receives only those loads of solid waste which can be composted. Loads not suitable for composting are diverted to sanitary landfills. The waste which is accepted is picked to remove additional non-compostable materials. Some of these materials have a value and are salvaged. After picking, the remaining material is pulverized and moisturized with various processing equipment. The material is then subjected to a composting period varying from one to two weeks during which time the temperature, moisture and air content is carefully controlled, and the material is periodically mixed. At the end of the composting period, the waste has been converted to compost, a humus like material having some value as a soil conditioner.

Composting has been practiced for many years with little success. In recent years, several research and development projects have been undertaken which have improved the process. The modern plant of today is a highly mechanized facility utilizing quality equipment designed or specifically adapted for this process. Several well known national companies and equipment manufacturers have built and are or were operating compositing plants in Texas, Arizona, Florida and elsewhere.

Unfortunately, some of these modern plants have had serious difficulty with odor problems. It is assumed that these problems can be overcome and within a few years it will be possible to process compost in a nuisance free manner.

The cost of compositing is considerably greater than the cost of landfilling. One recent plant constructed by a national company in cooperation with a major Florida City was placed into operation and received 100 tons of compostable refuse per day. The City pays a fee of approximately $3.25 per ton to the operator to take the material. This fee is more than 2 times the cost of landfilling and in addition the non-compostable material must be landfilled.

Whether the compost material can be sold is a debatable question. Attempts to sell soil conditioners in large quantity have not been successful. In the event the material cannot be sold, it must also be landfilled.

It is possible that the composting processes may be practical some years in the future. Today, in the Study Area, it is not recommended as a satisfactory method of solid waste disposal.

c. Sanitary Landfilling is a process in which solid waste materials are spread on the ground, crushed and compacted into a dense mass and covered with earth in a carefully controlled sanitary manner. This method is a proven system which when carefully planned and operated is economical, nuisance free, and does not pollute the water, air or land.

The filling can be on land ranging from level land to gullies or ravines. In many instances, rough and low value land has been improved by filling.

The term sanitary landfill has frequently been confused with open dumps or burning grounds. This is incorrect. A sanitary landfill is a specific process requiring careful design and management, proper equipment and operating techniques to assure that sanitary conditions are maintained at all times. The compacted waste is completely covered with earth on a daily schedule. Each day's waste is therefore enclosed in an earth cell. These cells preclude rodents and insects, odors, litter, air and water pollution and fires. Emphasis is placed on proper location, equipment, compaction and cover, sight screening, landscaping and other sanitary and aesthetic requirements.

The major disadvantage is that relatively large quantities of land are required. In certain parts of the country this requirement can be disqualifying. In the Study Area, adequate land is available at locations within economic hauling distances.

Another potential disadvantage is the frequent lack of public acceptance of sanitary landfilling. This is due to the bad reputation of dumps and the public confusion of dumps and sanitary landfills. A good public relation program and a demonstration of proper sanitary landfill operations can reduce the public resistance.

Except for very small or unusual operations, most sanitary landfills can be owned and operated for approximately $1.40 per ton. When compared to the cost of incineration and composting this method is usually the least expensive.

Several variations of the sanitary landfill method are frequently used. Certain materials such as broken concrete, demolition waste, ashes, etc. can be used to fill gullies, worked out quarries or low land without requiring full sanitary landfill methods. Filling a dry area with such material is referred to as dry landfilling. Filling areas which could be wet from ground water or surface overflow with suitable material is referred to as wet landfilling.

The sanitary landfill method is recommended for the Study Area for the following reasons:

(1) Land is available.

(2) The method has been proven satisfactory where properly operated.

(3) The method can meet all health, sanitation and pollution requirements, and be aesthetically pleasing.

(4) The method is adaptable to varying quantities and peak or slack rates.

(5) The method is the most economical.

The technology and equipment for sanitary landfilling and variations of the system are now available. The process is reasonably simple and economical, but it is not sufficiently simple that it can be designed and managed without attention by knowledgeable people and it cannot be done without adequate funds. Landfilling should be designed by engineers and managed by competent authority. It must also receive the necessary funds to be operated properly.

PART TWO - SURVEY OF SOLID WASTE

A. GENERAL. This part of the report contains an analysis of the present and future quantities and characteristics of the solid wastes generated within the Study Area.

The survey of solid waste materials was made in two parts. The first part was concerned with those materials which were being disposed of at major public disposal facilities. Extensive site surveillances were conducted at seven major public disposal facilities and are described in Section E.

The second part was concerned with those materials which were being disposed of at other than public disposal sites, referred to as "On Site" disposal. The on-site disposal includes those materials which can be expected at public disposal sites in the future and those materials which will continue to be disposed of and/or accumulated on site. The on-site materials were compiled from commercial and industrial surveys described in Section B and through special studies which were conducted to evaluate the wastes from scrapped automobiles, diseased trees, packinghouses and commercial feedlots. These studies are described in Section D.

B. COMMERCIAL AND INDUSTRIAL SURVEYS

1. Surveys. A survey was conducted to determine the nature and magnitude of wastes from various commercial and industrial firms in the Study Area. The purpose of this survey was to determine if there were individual companies or types of companies with wastes that could have a significant effect on disposal practice. In addition, the survey provided data which could be used to supplement waste quantity information obtained from the landfill study such as present and future material which can be expected at a public disposal after air pollution control and stricter landfilling regulations have been put into effect. The firms surveyed were selected from a complete listing of industrial and commercial firms in the Study Area.

A personal visit or telephone call was used to secure detailed information from 95 firms, representing construction; manufacturing; transportation and public utilities; wholesale and retail trade; finance, insurance and real estate; and services. Information pertaining to the nature and quantity of waste, and information concerning those wastes which are considered hazardous, contaminated or otherwise requiring special handling in transfer and disposal operations was gathered. Liquid wastes such as oils, solvents, paints and inks which cannot be discharged to the sewer system are included in this category.

All of the firms interviewed were evaluated as to type of process or product, nature of the waste, general magnitude of waste and method of disposal.

2. Waste Quantity. The firms contacted were categorized as to type of business activity and divided into general type of product or process for evaluating the quantities of waste generated. The categories of waste are listed in Table II-1

Quantities of waste were estimated in most cases by plant superintendents or office managers. Most of the estimates were in terms of daily or weekly volumes with some weight information to assist in determining bulk densities for the various categories. The reliability of the estimates varied considerably due to the fact that the smaller establishments generally estimated in terms of number and size of storage containers, while in larger firms, particularly manufacturers, the magnitude of the waste disposal operation, and production accounting procedures necessitated more specific knowledge of quantities involved.

In order to establish a basis for relating the data obtained from the survey to the total waste generated in the Study Area, waste quantities were evaluated in terms of the number of employees in the individual firms contacted.

Table II-1 lists each of the individual categories in the commercial and industrial survey and shows the maximum, minimum and average waste quantity generated per employee per day. Quantity figures in terms of average daily pounds per employee are based on a full 7-day week. Suitable adjustments were made to reflect actual quantities when the work week was less than 7 days.

3. Total Industrial - Commercial Waste. The present industrial and commercial wastes were projected using the data obtained from the survey. The employment statistics used were from the 1967 County business patterns. Projections were made for each of the categories listed in the preceding paragraph. Table II-2 shows the estimated present quantities of waste in both cubic yards per day and tons per day, and gives the percentage surveyed of the total employment in each category. Approximately 25% of the total employment of the manufacturing group was surveyed, and approximately 21% of all groups of the total non-agricultural employment in the Metropolitan area were included in the survey. The quantity data is summarized in Table II-3.

In order to establish the amount of present and revised public site disposal and on-site disposal, the quantities in Table II-2 have been tabulated as follows:

1. Present quantities of waste material currently being sent to public disposal facilities.

2. Present quantities of waste material currently being disposed of on-site or accumulated on-site.

TABLE II-1. COMMERCIAL AND INDUSTRIAL SURVEY MATERIAL QUANTITIES PER EMPLOYER

CATEGORY	NO. OF FIRMS SURVEYED	RANGE LB/EMP/DAY MIN/MAX	AVG LB/EMP/DAY
I. Construction			
A. Demolition	4	2000/14,800	4000
B. General Contracting	14	3.0/111.0	5.0
II. Manufacturing			
A. Food and Meat Products	7	2.2/13.8	13.8
B. Grain Mill Products	3	15.1/35.0	17.3
C. Apparel and Related Products	2	1.1/4.4	5.7
D. Lumber and Wood Products	3	10.7/35.0	26.1
E. Paper and Allied Products and Printing and Publishing	3	2.4/40.0	4.1
F. Chemicals and Allied Products	3	1.1/83.1	37.1
G. Stone, Clay and Glass Products	8	5.7/266.7	143.0
H. Primary Metal Industries	2	5.9/127.3	68.8
I. Fabricated Metal Products	2	2.7/7.0	6.8
J. Machinery	3	4.8/17.1	5.1
III. Transportation and Other Public Utilities	6	0.2/111.3	73.0
IV. Wholesale Trade			
A. Motor Vehicles and Automotive Equipment	8	12/360	186
B. Drugs, Chemicals, and Allied Products	3	4.7/10.0	6.2
C. Groceries and Related Products	2	3.4/6.5	4.9
D. Electrical, Machinery and Hardware Goods	5	0.5/5.6	2.7
E. Miscellaneous Wholesales	3	0.7/120.0	17
V. Retail Trade			
A. Building Materials and Farm Equipment	2	2.1/7.1	4.6
B. General Merchandise	2	1.2/1.5	1.3
C. Food	2	21.1/44.0	37.2
D. Automotive Dealers	3	2.0/43.1	27.2
E. Apparel and Accessories	4	1.0/10.0	2.1
F. Furniture and Home Furnishings	3	15.5/263.6	68.3
G. Miscellaneous Retail Stores	2	6.7/11.1	8.7
VI. Finance, Insurance, and Real Estate	3	0.9/6.9	1.1
VII. Services			
A. Amusements	3	7.4/17.1	11.5
B. Miscellaneous Repair Services	5	0.9/2.9	1.4
C. Hospitals and Medical Services	4	1.7/3.4	2.

TABLE II-2. COMMERCIAL & INDUSTRIAL SURVEY - MATERIAL QUANTITIES

	Percent Group Surveyed	Estimated 1968 Employment	Present Material to Pub. Disposal		Present Material to On-Site Disp.		Revised Material to Pub. Disposal		Revised Material to On-Site Disp.		Additional to Public Disposal	
			CY/D	Tons/D	CY/D	Tons/D	CY/D	Tons/D	CY/D	Tons/D	CY/D	Tons/D
I. CONSTRUCTION												
A. Demolition	50.0	1,129	2.0	2	1683.2	2058.0	2.0	2	1683.2	2058.0	--	--
B. General Contracting	4.1	10,159	114.6	12.9	46.3	3.0	161.0	15.8	--	--	46.3	3.0
Total		11,288	116.6	13.1	1729.5	2061.0	163.0	16.0	1683.2	2058.0	46.3	3.0
II. MANUFACTURING												
A. Food & Meat Processing	35.6	13,777	777.6	94.2	12.2	1.3	789.8	95.5	--	--	12.2	1.3
B. Grain Mill Products	37	1,375	116.2	11.9	--	--	116.2	11.9	--	--	--	--
C. Apparel & Related Products	69.3	965	7.8	1.7	2.2	14	10.0	1.8	--	--	2.2	14
D. Lumber & Wood Products	22.4	175	31.3	4.9	.08	.001	31.4	4.9	--	--	.08	.001
E. Paper & Allied Products	26.4	3,720	65.5	7.6	--	--	65.5	7.6	--	--	--	--
F. Chemicals & Allied Products	12.4	1,218	161.3	22.6	--	--	161.3	22.6	--	--	--	--
G. Stone, Clay, & Glass Products	60.7	611	--	--	34.1	43.7	--	--	34.1	43.7	--	--
H. Primary Metal Industries	21.0	2,921	97.1	69.5	--	--	97.1	69.5	--	--	--	--
I. Fabricated Metal Products	29.5	2,134	78.6	7.3	--	--	78.6	7.3	--	--	--	--
J. Machinery	48.1	2,635	79.6	7.3	--	--	79.6	7.3	--	--	--	--
Total		29,032	1415.0	227.0	48.6	45.1	1429.4	228.4	34.1	43.7	14.5	1.4
III. TRANSPORTATION & PUBLIC UTILITIES												
Total	50.3	16,364	53.6	3.2	1260	594.2	53.6	3.2	1260.0	594.2	--	--
IV. WHOLESALE TRADE												
A. Motor Vehicles & Equipment	63	1,587	682.5	147.6	--	--	682.5	147.6	--	--	--	--
B. Drugs, Chemicals & Allied Proc	3.4	676	17.6	2.1	--	--	17.6	2.1	--	--	--	--
C. Groceries & Related	40	1,563	40.3	3.8	--	--	40.3	3.8	--	--	--	--
D. Electrical & Hdwe. Goods	2.2	4,787	81.8	6.4	--	--	81.8	6.4	--	--	--	--
E. Machny, Equip. & Misc. Whole	7.1	3,984	260.6	33.8	--	--	260.6	33.8	--	--	--	--
Total		12,597	1082.8	193.7	--	--	1082.8	193.7	--	--	--	--
V. RETAIL TRADE												
A. Building Material	5.3	1,077	30.2	2.5	--	--	30.2	2.5	--	--	--	--
B. General Mdse.	28.2	6,638	45.4	4.3	--	--	45.4	4.3	--	--	--	--
C. Food	2.4	4,596	250.0	22.9	658.3	62.5	908.3	85.4	--	--	658.3	62.5
D. Automotive Serv. Dealers & Sta	2.0	4,323	105.0	60.5	--	--	105.0	60.5	--	--	--	--
E. Apparel & Accessories	12.9	2,349	24.5	2.45	--	--	24.5	2.45	--	--	--	--
F. Furniture & Home Furnishings	17.4	1,229	433.9	39.7	21.8	2.3	455.7	42.0	--	--	21.8	2.3
G. Misc. Retail Stores	1.8	3,299	171.4	14.3	--	--	171.4	14.3	--	--	--	--
Total		23,511	1060.4	146.7	680.1	64.8	1740.5	211.5	--	--	680.1	64.8
VI. FINANCE, INSURANCE & REAL ESTATE												
Total	12.7	19,217	80.3	8.0	--	--	80.3	8.0	--	--	--	--
VII. SERVICES												
A. Amusements	10.9	1,407	64.2	7.3	8.3	.7	72.5	8.1	--	--	8.3	7
B. Misc. Repair & Auto Rental	6.9	1,392	10.1	1.0	--	--	10.1	1.0	--	--	--	--
C. Hospitals	27.4	15,004	96.0	13.1	74.8	6.9	96.0	13.1	74.8	6.9	--	--
Total		17,803	170.3	21.4	83.1	7.6	178.6	22.2	74.8	6.9	8.3	7
VIII. C & I SURVEY DAILY TOTAL	21	125,811	3979	613	3801	2773	4728	683	3052	2703	749	70
IX. C & I SURVEY ANNUAL TOTAL			1,452,335	223,745	1,387,365	1,012,145	1,725,720	249,295	1,113,980	986,595	273,385	25,550

NOTE: Cubic yards are loose volume as stored on premises.

3. Revised quantities of waste material to public disposal facilities. (This is based on current quantities but reflects the intention of the firm if stricter disposal laws were enacted and enforced)

4. Revised quantities of waste materials to be disposed of on-site or accumulated on-site. (These quantities are also based on current rates but are adjusted to reflect the change in disposal method mentioned in 3 above.)

5. Additional material to public disposal. (Based on current rate of disposal but reflects changes contemplated in 3. and 4. above.

TABLE II-3. SUMMARY OF COMMERCIAL AND INDUSTRIAL ANNUAL WASTE QUANTITIES

	Present (1968)		Revised (1968)		Change	
	Tons	C. Y. *	Tons	C. Y. *	Tons	C. Y. *
On Site	1,012,145	1,387,365	986,595	1,113,980	-25,500	-273,385
Public	223,745	1,452,335	249,295	1,725,720	+25,500	+273,385
Total	1,235,890	2,839,700	1,235,890	2,839,700		
On-Site	81.9%	48.9%	79.8%	39.2%	- 2.52%	-19.7%
Public	18.1%	51.1%	20.2%	60.8%	+11.3%	+18.8%

* C. Y. are not compacted (These C. Y. were very loose and should not be compared to other C. Y., loose or compacted).

The present total commercial and industrial wastes being disposed of at public sites, as developed in the commercial and industrial survey, is 223,745 tons per year as shown in Table II-3. This quantity is greater than the 197,000 annual tons developed during the landfill surveys described in Section E and shown in Table II-24. The landfill survey is considered a more reliable estimate since it is based on a actual measurement of waste volumes over a week's operation at each of the major public landfills. The higher values determined from the commercial-industrial survey may be due to a number of factors, including a tendency for the firms to over-estimate their quantity of waste. a relatively large base from which to project quantities in some categories, and possible inaccuracies in projecting waste quantities based on employment for categories such as the meatpacking and demolition industries which process their wastes by other internal disposal processes.

Although a close correlation could not be made between the two surveys, the commercial-industrial survey did meet a primary objective of establishing an estimate of what portion of the present commercial and industrial waste currently being disposed of on-site would be diverted to public facilities if stricter landfill regulations and air pollution controls were established and enforced.

Table II-3 shows that 81.9% of the tonnage and 48.9% of the cubic yards of the total commercial and industrial waste was disposed of in on-site facilities, whereas 18.1% of the tonnage and 51.1% of the cubic yards were sent to public facilities for disposal. The commercial and industrial firms interviewed indicated that if stronger landfill regulations and air pollution controls were in effect during 1968, the waste disposal practice would be slightly different. Under these new conditions referred to as "revised" in Table II-2 and Table II-3, the on-site disposal would have been 79.8% of tonnage and 39.2% of the volume. The public facilities would receive 20.2% and 60.8% respectively. The difference between the present and future practice amounts to approximately 25,500 tons and 273,385 cubic yards increase in public disposal and an equal decrease in on-site disposal. This potential increase in materials sent to public sites is equal to 11.3% of the tonnage and 18.8% of the volume currently being sent to public sites. These two percentages were used to adjust the quantities of commercial and industrial materials as measured during the landfill surveillances described in Section B.

The quantities of commercial and industrial waste being disposed of on-site in private facilities is very large and on a tonnage basis is approximately equal to the total of all waste disposed of at public facilities. Some of the private landfills are reasonably well run and some are entirely inadequate. Suggested standards and controls are recommended in Part IV. These facilities should be permitted and encouraged but should be regulated to the extent that they do not become a nuisance or source of pollution.

C RESIDENTIAL SURVEY. Residential solid waste management consists of removing the waste from the premises for disposal at some central disposal facility or disposal on-site or some combination of removal and on-site disposal. In the larger communities of Bellevue, Council Bluffs, Offutt AFB, Omaha and Ralston the governing body provides a regular collection service for residential waste for its citizens. The other municipalities in the Study Area do not offer this service. A summary of collection practice is shown in Table I-4 found in Part I.

In Bellevue, Offutt AFB, Omaha and Ralston the collection service provided includes all residential waste, whereas in Council Bluffs the service is restricted to kitchen waste.

With the sole exception of Offutt AFB, all communities permit residences to burn combustible wastes on their premises, either thru the lack of no-burning regulations or the ineffective enforcement of existing regulations.

In those communities where municipal collection service is not provided by the governing body, the residents may employ private collectors or may haul their own waste to the municipal dump which is frequently provided by the smaller communities.

Where on-site disposal is practiced, and this must include all communities to some extent with the exception of Offutt, the usual practice is to burn combustible waste in some informal and inefficient incinerator such as a 55 gallon drum locally referred to as a burning barrel. Many municipal officials and residents condone the practice of burning clean dry combustibles in burning barrels. Observation will reveal that burning barrels are used to burn not only paper and other clean dry combustibles but garbage and other odor and smoke producing wastes. This not only produces air pollution, smoke and odor nuisances, residue for rats, and unsightly conditions; but also represents a major source of fires requiring fire department assistance.

Residential waste collection is a responsibility of the community and this service should be provided either thru the use of municipal forces and equipment or thru a municipal contract. On-site burning of this waste would be unnecessary if proper organized collection service is provided to all residences in the community. In Part IV of this report, recommended ordinances are presented which provide for collection of residential solid waste and forbid the burning of waste in other than licensed incinerators.

Residential solid waste delivered to the major disposal facilities was measured during the landfill surveys described in Section E. Also measured was the residue from waste material burned on-site. The portion which was not measured was that part burned on-site.

A study was conducted to determine the effect of backyard incineration on domestic wastes based on quantities collected from routes where incineration of combustibles is extensively practiced as compared to routes where there is little or no incineration practiced.

While the quantity of ordinary domestic waste which will be produced by a specific community depends upon the geographic location, season of the year, economic and social level, and other special community characteristics; the major reasons for variation in domestic waste production are community regulations and their enforcement, and refuse disposal services provided.

Because of variation from community to community, exact data determined by measurements are desirable in order to provide a sound basis for determining a comparison.

Under similar conditions the amount of ordinary domestic waste produced in a community will be in proportion to the population. Refuse quantities are usually expressed in pounds per capita per year and/or per calendar day.

Two residential communities with small and medium sized lots and with single and multiple family dwelling units were selected to determine this comparison. The two communities were Capehart Housing and Council Bluffs. Capehart Housing, located at Offutt Air Force Base, has a population of approximately 6600 people, consists of 1803 family dwelling units, offers complete collection service, and permits no on-site incineration. Council Bluffs, on the other hand, offers partial collection service and allows on-site incineration. A portion of Council Bluffs consisting of residential areas only, was selected to exclude any influence of commercial waste. It was anticipated that the additional per capita production of domestic waste collected from Capehart Housing would represent the amount of per capita domestic waste disposed of on-site by incineration in Council Bluffs. However, the opposite results were obtained from this survey. Council Bluffs produced approximately one-half pound more per capita daily domestic waste than did Capehart Housing.

When the selection of these two communities was being considered it was recognized that Capehart was a special community populated exclusively by military families, but there was an excellent cross section of senior and junior officers and enlisted men, living in dwellings varying from four-bedroom single family units to two-bedroom multiple family units. There were no transients and no barracks included in this study. Factors which may have influenced the results from Capehart are that all dwelling units are equipped with garbage grinders and the community is relatively new, which would reduce the amount of tree wastes. Whatever the reasons may have been, the results were unuseable.

The Study Area was extensively examined in an attempt to find suitable areas which could be used in lieu of Capehart. None could be found which were large enough for comparative purposes, and which were not special for one reason or another. As a suggestion to future investigators in this field, it will probably be necessary to measure a community's solid waste products under conditions which allow burning and then remeasure the community after all burning has been effectively stopped.

It was concluded an estimate of the quantity of waste being burned would be satisfactory, since residential or domestic waste represents only a small portion of a community's total solid waste. It was assumed that approximately 50% of the dwelling units in the Study Area have some burning capabilities and that 50% of the domestic waste is readily combustible. It was also assumed that the burning facilities had a 25% use factor. A factor of 6% (.5 x .5 x .25 = .0625) was calculated and added to the quantity of domestic solid waste measured during the landfill surveys to compensate for on-site burning of this waste.

D. SPECIAL STUDIES

1. General. During the organization of this study, it was recognized that there were several special waste problems which could influence present and future planning. These special wastes, though common to communities, can present unusual collection and disposal problems. Individual studies were conducted and analyzed to determine the influence they would have on the

solid waste program for the area. These special wastes discussed in the following paragraphs include automotive vehicles and the related salvage industries, special tree waste caused by Dutch Elm disease, meat packing industry wastes, and commercial feedlot industry wastes.

2. Automobiles and Scrap Metal

a. General. Abandoned automobiles, auto salvaging and scrap metal operations were studied to determine the extent of the solid waste involved. It was found that they do not present a solid waste problem of any significant magnitude, although, they do present many other serious community problems. It was also found that the auto salvaging and scrap metal industries are not understood by the general public. In the following paragraphs, data is presented to explain the function of these industries, the problems they create, what can be done about the problems and why they do not create solid waste in any large quantity.

b. The Auto Salvage Industry. The motor vehicle is a vital part of our society affecting the general economic structure and life of the community. The motor vehicle has a definite life cycle. Based on national averages, the motor vehicle survival rate is as follows:

Years after Original Registration	Percent of Vehicles Surviving
6	95
8	81
10	56
12	33
14	18

During its life cycle the motor vehicle will pass from a transportation unit to a valuable source of materials providing spare parts for other units still operable. Eventually it becomes a natural resource of scrap metals to be used by the metal making industries.

Information from automobile manufacturers and the salvage industry reveals the average total weight for an automobile is about 3,300 pounds, of which 600 pounds, or 18% is not salvable metal, such as upholstery, rubber mats, tires, hoses, insulation, undercoating, glass and plastics. The balance of the weight is composed of various kinds of ferrous metals and non-ferrous metals, such as copper, zinc, aluminum, lead, brass, bronze and others.

The auto salvage industry has been historically identified as the "junk yard," which it is not. It deals in the salvaging of reusable parts for the automotive industry. With the tremendous and continuing increase of automobile production over the years, the auto salvage industry provides a needed service to the community. The 1985 predicted motor vehicle population of the United States is estimated at 115 million. A damaged automobile, economically unrepairable, can provide many valuable and serviceable spare parts, including partial body sections, for the repair of other less damaged vehicles. Unsalvable or obsolete parts are sold to the scrap metal industry.

This industry has a well deserved, bad reputation for aesthetic conditions. Recent Federal Legislation in the form of the Highway Beautification Acts, provides certain regulations concerning "Auto Wreckers" near or adjacent to Federally Funded Highways, and has brought much attention to the industry. These regulations require certain fencing and screening of the operations under prescribed conditions. They do not apply to many auto salvage operations in urban areas which must be controlled by other zoning laws or ordinances. The auto salvager usually operates in an industrial zone, but may operate in other zonings through the legality of zoning variances.

The salvager normally maintains a large and unsightly stockpile of auto hulks, all potential items of solid waste. When the auto has been stripped of all possible spare parts, it is ready for the conversion to scrap metal. Most scrap metal processors of auto hulks insist they be burned to rid them of all non-metallic material before they will be accepted as scrap metal. This requirement is more of an accepted practice than an absolute necessity. It makes the metal processor's job easier and reduces his costs but the open burning of auto hulks is a nuisance to the community, a source of air pollution and a fire hazard. Passage and strict enforcement of anti-burning laws are necessary to curb this practice. Auto hulks can be processed for metal salvage without burning and are processed this way in many communities. Elimination of burning will create some additional costs to the industry; however, this is a problem for the industry to overcome as a part of doing business.

The problem of large inventories of auto hulks is a problem the salvage industry has, and will continue to have as long as scrap metal prices remain at the present low level. New metal making methods have lessened the demand for scrap metal and consequently the price has been substantially reduced. Many salvagers stockpile auto hulks hoping for future price increases, and move out hulks only to make room for newer models.

The survey included 55 salvage yards in the Study Area and revealed an estimated 39,500 hulks on hand.

The problem confronting all scrap processors in the Study Area has both technological and economic roots. It begins with the fact that steel mills have reduced their reliance on scrap as a raw material. This is due to the installation of new types of steel making furnaces and the reluctance of some large integrated mills to accept automobile scrap in large tonnages.

Whenever demand for scrap drops, auto scrap is most affected. It is probably the most difficult and expensive type of scrap to prepare. Besides the ton of usable ferrous scrap, a car contains copper, lead, plastics, glass and other non-metallic materials. All of these can be poison to a batch of steel. They should be removed by the processor to produce acceptable steel scrap.

To meet this demand, many scrap processors have installed large and expensive shredding devices such as the one in Council Bluffs, Iowa, which tear and shred an anto hulk into small pieces, including the steel hulk, the glass, rubber, dirt, and plastic. The steel is removed from the non-magnetic material by magnetic separation. The remaining material is sometimes picked over for copper or other metals but it is mostly waste to be disposed of at a landfill. The magnetically separated steel is high grade scrap, relatively free of the chief contaminant, copper. This high grade scrap is worth from $13 to $36 a gross ton delivered, depending on the area. From this price the processor must deduct transportation costs, production costs, the cost of daily operation, and his return on his investment. Only then can he figure what he can pay for his raw material, the old car itself. Ten dollars to $12 for a car can often be considered to be a fairly good price.

Operators estimated that approximately 40% of all vehicles on hand would be disposed of with an appreciable increase in the price of scrap metal. The yards surveyed occupied approximately 212 total acres, with an average of about 188 vehicles per acre.

In general, the housekeeping practices of the auto salvage industry are poor, contributing to the public demands that something be done to clean up this industry. Part of the problems are inherent in the nature of the work. Salvage yards are difficult to maintain in an acceptable and nuisance-free condition, but it can be done. A few of the operators have made attempts to screen their yards and present a decent appearance. They would do more if the industry was required to conform to currently existing ordinances and zoning regulations.

Although many hulks are retained in hopes of improved scrap prices, many accumulate simply because it costs more to load and haul the hulks to the metal salvager than they are worth. The stripped hulk at this stage is an industrial waste to the auto salvager. By allowing the hulks to accumulate, the operator is postponing the expense of disposal. If he were required to site screen his yard and control the weeds and insect breeding conditions around these old hulks, more of them would be promptly removed to the scrap metal dealer.

The auto salvage industry in the Study Area has a potential solid waste problem in the large inventory of auto hulks. This potential will not become a problem of disposal to the community while there is a market for the scrap metal. Even though it may cost the salvager more to haul a hulk to the scrap dealer than he is paid for the hulk, it is more economical than hauling the hulk to a municipal disposal site and receiving nothing or being charged to dispose of it.

Strict enforcement of ordinances in the Study Area pertaining to operating conditions in and around salvage establishments is necessary to improve aesthetic conditions and reduce the health and fire hazards for the community. Enforcement of these regulations may cause a temporary surge of auto hulks onto the local scrap market, but we believe this would be a minimal problem. Some minor costs to the salvager will result, but this must be considered as a cost of doing business.

The auto salvage industry plays an important role in the community. However, they must be required to conduct their business in a manner that it will not interfere with the welfare of others.

c. Scrap Metal Industry. The scrap metal industry is responsible for the final phase in the life cycle of the automobile and the source of other salvaged metals before they are reclaimed in new metal making processes. This industry has provided over 40 million tons per year of scrap metal for metal making industries and foreign exports. Over 40% of the nation's copper and more than 1/2 million tons of lead is recovered annually by the scrap metal industry. The automobile hulk accounts for about 5 million tons of metal per year.

This industry experiences many of the same problems outlined for the auto salvagers. Large stockpiles of processed scrap are often on hand due to the lack of demand for the product. Large and expensive machinery is required to process the metals and auto hulks and the operation is seldom confined within buildings.

The price being paid for processed scrap today is not high enough in many areas to allow the processor to go out extensively for automotive hulks as a source of materials. It is not high enough to encourage many graveyard operators and others to ship cars to processors at their own expense.

There is absolutely no question that the scrap industry could process every car in the Study Area available for scrap with its existing production capacity. The scrap processor in Council Bluffs can process 400 to 500 auto hulks in a single normal working day, and is a good example of the capability of present technology.

d. Abandoned Automobiles. The present problem of abandoned automobiles in the Study Area does not appear to be large. Most old and unserviceable vehicles find their way to the scrap metal dealers.

Unserviceable or abandoned automobiles on private property are considered the problem of the property owner. If abandoned on a public street or property, the City will haul it away, impound it, and attempt to locate the last registered owner. If located, the last registered owner is usually responsible for any cost incurred during impoundment. Periodically the impounded vehicles are auctioned to the highest bidder. Impound costs are deducted from the bid price and the balance, if any, is sent to the last registered owner, if he has responded to the previous notice. Where no owner can be found, auction proceeds are retained by the City.

The present handling of abandoned vehicles in the Study Area is generally adequate considering the number of vehicles involved. Abandonment may increase if salvagers become reluctant to receive vehicles too old for parts or salvage value, if new operating regulations are enforced. No serious problem is anticipated. Improved vehicle identification methods, strong enforcement, and proper penalties for abandonment of vehicles, should control any increase.

e. Automobile Disposal by Municipalities. With the increasing cost of processing of auto hulks, and the passage of air pollution regulations, it is possible that salvagers will be reluctant to receive or pay for hulks for scrap purposes.

If this were to happen, it is possible to dispose of auto hulks in landfills. During a previous solid waste study an experiment was conducted at a municipal disposal site to determine what volume would be required for an average hulk. A 1957, medium priced station wagon, including upholstery, frame and heavy undermetal, but excluding the engine block, bumpers, wheels and tires; a typical abandoned auto type, was placed right side up on level ground. A landfill bulldozer was used to crush the hulk. The operation took approximately five minutes, reducing it in volume from about 432 cubic feet to less than 108 cubic feet, or 4 cubic yards.
The compacted hulk was easily included with other waste and covered with earth. This is a poor ending for a proven natural resource, but indicates disposal by landfilling is practical.

Many landfill operators do not wish to be bothered with crushing and burying auto hulks. They are a bother but it can be done economically and is a satisfactory way to dispose of hulks that become a burden to the community.

f. Laws and Regulations. The auto salvage and scrap metal operation, and the abandoned vehicle are technically not a solid waste problem. They are; however, a community problem requiring proper control insofar as they affect the health, safety and well being of the community. Existing ordinances and regulations are not adequate for several reasons. In some instances, they are unrealistic and consider auto salvaging, the scrap metal industry, junk yards and pawn brokers as being the same. Each are different and should be treated separately. Some requirements are not practical and if enforced would require unwarranted expense not only to the industry but to the municipalities. In other cases, there are inadequate requirements to protect the public. As a result, there is little effective enforcement of existing laws and regulations.

Laws of the various communities should be reviewed and amended to be realistic and effective. Of particular importance are zoning regulations; provisions to outlaw all open burning; requirement for fencing and that operations be conducted within fenced areas and not in the public right-of-way; and rodent, weed and insect control. All communities should consider an ordinance which would class all inoperative motor vehicles on private property in residential zones, and not properly garaged, as "litter" and require removal or proper storage.

The City of Council Bluffs is a prime example of what can be accomplished by proper enforcement of this ordinance. The offender is served a removal notice and allowed a reasonable amount of time, generally from 5 to 30 days, to clean up the nuisance. If the offender does not comply with the notice within the allotted time, the offender must appear in court and is generally fined. Approximately 2000 non-licensed or junked cars located in backyards, in and around the city, have been removed since February 1966 by enforcing this litter ordinance.

Auto Salvaging Industry Statistics

Sampling Group:

Auto salvage operations observed and interviewed within Study Area: 55
Estimated total wrecked vehicle inventory on hand: 39,50
Estimated total acres occupied by Salvagers, Study Area: 212
Estimated wrecked vehicles per acre, on hand: 188
Estimated hulks immediately available from current inventories, with improved market conditions: 15,800 (40.0%)

Study Area:

Estimated current monthly scrapping rate: 1,075 vehicles.
Estimated 1968 vehicle registration: 214,300
Estimated yearly scrapping rate, Study Area: 6% of registration
Estimated yearly scrapping rate, Nation: 7% of registration
Estimated average net increase in yearly registration, Study Area: 4%
Estimated average net increase in yearly registration, Nation: 3%
Estimated rate of vehicle registration and scrapping, Study Area:

	Registration	Scrapping @ 6%
1968	214,300	12,900
1969	222,700	13,400
1970	231,100	13,900
1975	273,100	16,400
1980	315,100	18,900
1985	357,100	21,400
1990	399,100	23,900
1995	441,100	26,500
Estimated Total Scrapped Vehicles, 1968-1995		550,700

3. Special Tree Waste.

a. General. In a large community or metropolitan area the influence of any single industrial or commercial firm or groups of allied firms usually has little influence on the total solid wastes of the community. They could double their waste or eliminate it completely, and still have little immediate effect on the magnitude of the community's solid waste facilities. Over a long period of time their influence might eventually be felt but there would be ample time to anticipate the changes necessary.

Changes in population trends and in per capita waste contributions are sufficiently gradual that they too can be anticipated by solid waste managers in time to make any necessary changes.

Problems that can become serious in the management of solid waste disposal must involve at least two elements: (1) large quantity changes either increases or decreases; and (2) a short time during which the change takes place. Wastes resulting from the removal of large quantities of diseased American Elm trees in a short period of time meets these two items of criteria and could be a problem if not anticipated.

American Elm trees are being killed by the Dutch Elm Tree Disease in great number in recent years. The disease is caused by a fungus named Ceratocystis Ulmi which is carried by the European Elm Bark Beetle. Fungus spores are spread from diseased trees to healthy trees by the beetle and enters the healthy trees through openings in the bark of twigs caused by feeding insects. The disease was first found on the east coast about 1930 and since that time has spread throughout the east, north to Canada and into the south. At the present time it has worked as far west as Iowa, Nebraska, Kansas and Missouri.

Dutch Elm disease was first found in the Study Area in 1960. By 1963 there were 22 known cases of infected trees and 80 suspected cases.

It is estimated that, since the discovery of the Dutch Elm disease in the Study Area, 35% of the 613,355 original elm trees have been removed or are presently diseased and must be removed. By the end of 1968 approximately 214,674 diseased trees had been removed, most of which have been disposed of by open burning at public sites. Few volume or weight records have been maintained; therefore, future volumes and weights are based on known properties of elm wood, existing estimates, and information developed in cooperation with city, state and federal foresters, and county agents.

At the present rate of loss, it is estimated that most of the American Elm trees in the Study Area will be diseased by 1973. The greatest quantity of these trees for which solid waste disposal facilities must be provided are located in the cities of Omaha, Bellevue, Council Bluffs and the immediate area. This amount of special tree waste is estimated to be 306,984 elm trees, or 595,550 tons. The amount of special tree waste in remote or rural areas which probably will not be removed or will not be brought to solid waste disposal facilities is estimated to be 91,697 elm trees or 177,892 tons. This latter amount of special tree waste is not included in the quantity for which disposal must be provided. See Appendix Exhibit II-1 for Elm Tree Statistical Information.

During the landfill surveys discussed in Section E of this Part II the quantities of waste from diseased elm trees were recorded separate from the other wastes. To the above quantities which were measured, additional estimated quantities were added to reflect those quantities which were disposed of on-site. The sum of the measured quantities and on-site quantities represent the total diseased elm tree wastes. These are shown as Special Tree Wastes in Table II-24.

Since the Special Tree Wastes represent approximately 17% of the total waste, it is an important segment of the total. Only approximately 1/6 of this material was measured at public disposal facilities. The remaining 5/6 were disposed of elsewhere. If proposed regulations and controls concerning landfills and air pollution are adopted and enforced these 5/6 will appear at public disposal facilities and must be anticipated. There must be adequate landfill capacity and equipment to handle these significant quantities. Once the capacity to handle the predicted quantities is available, the reduction in quantity expected in 1973 must also be anticipated, because the schedule of fees to finance the operation is based on expected quantities. The fee structure and its relationship to expected quantities and fixed and variable costs are discussed in Part III.

b. Disposal. Elms killed by Dutch Elm disease can be used for fireplace wood, provided the wood is burned before spring. If only a portion of the cut wood is used, beetles emerging in the spring from the remaining logs will carry the fungus to healthy elms. To prevent this from occurring, the wood should be stripped of bark or thoroughly sprayed with a suitable chemical which will kill the beetles. The fungus is not spread by the ashes or smoke from infected elms.

Investigation indicates that elm wood has few commercial or industrial uses and then only if the user is close to the source of material to reduce shipping costs. Elm wood is used for making pallets, dunnage, furniture and veneer, although the demand is very small. The physical properties of elm wood preclude its use as structural material. It tends to split and twist when drying. The largest consumers of elm wood are the pulp mills making fiberboard, corrugated boxing and particle board and similar material. There are no pulp mills located in the immediate area currently processing elm wood and the more distant mills expressed little or no interest because of excessive shipping costs; therefore, this outlet was not considered further.

Many mills refuse to accept city elm trees for chipping because of operating problems resulting from the presence of tramp iron. Marketing elm wood for pulp purposes is not recommended.

Elm wood as a fuel for power plants was considered. It would again have to be chipped. After chipping, the elm fuel would cost more per useful Btu than coal. This outlet was not considered further.

Elms killed by Dutch Elm disease can be disposed of by incineration or open burning. It is estimated that incineration of mixed solid waste costs several times as much as disposal by sanitary landfill methods under present conditions in the Study Area. In the preceding paragraph it was stated that the chipped elm wood cost more per useful Btu than coal. It is apparent that incinerators which would burn the elm wood are not feasible even when considering waste heat recovery. No further consideration was given to incineration of elm tree wastes.

It is possible to burn the elm trees in open fires. Although logs are difficult to burn, a proper arrangement could be made which would reduce most of the wood to ash. It would be possible to control such a burning operation from becoming a fire hazard although a considerable amount of land preparation and labor would be required. This method is not recommended because of the air pollution problem that would be created and the expense involved.

Diseased elm tree waste can be properly disposed of in sanitary landfill sites, separately or with other solid waste of the community. When filled separately, many sites would be available that might not be available for mixed operations. This is the only advantage. When filled alone, considerably more earth is required. Logs are particularly difficult when handled alone. They pile up one upon another and make a very difficult surface upon which to work landfill equipment. The limbs are not adequate to solve this problem. Large quantities of earth are required to fill around logs to make a stable mass.

When filled with other solid waste from the community, the other material packs around the logs making a satisfactory working surface. Only cover dirt is required. With the other material adding to the total volume, the unit operating cost of the operation is reduced. It is less expensive to bury the elm tree waste with other solid waste than to bury it in a site separately.

The cost of operating a sanitary landfill in the Study Area has been estimated to be $1.40 per ton. This is the most economically acceptable way to dispose of the diseased elm tree wastes.

4. Meatpacking Industry Waste. Included in this category are solid wastes from slaughter plants and their holding pens, and the pens of the central stock yards. None of this material was measured at any of the landfill surveys described in Section E; therefore none is included in that quantity of waste which was disposed of at public disposal facilities. Currently these materials are being disposed of through public sewers, piled on the premises of packing plants, hauled to farm land or dumped at a railroad siding. These materials were studied and are included in the Commercial and Industrial Surveys described in preceding Section B. The solid waste from the Omaha slaughter houses will continue to be flushed to public sewers for treatment. These quantities were given no further consideration in this report.

It has been assumed that packing plants will not be permitted to continuously pile solid waste on their premises; that haul to farm land disposal will be uneconomical; and that dumping of pen waste without adequate sanitary landfill facilities will not be permitted. Experience in other cities has shown that in recent years packing industries have been required to dispose of this material in a sanitary manner in order to eliminate the odors caused by the decomposition of the organics and the problem of rat and insect control.

Paunch manure can be treated or disposed of using a variety of methods. It can be incinerated, dried or otherwise processed for feed, or placed in sanitary landfills. Incineration is considerably more expensive than sanitary landfilling and is not considered further in this study. Feeding of paunch manure has been tried and abandoned over a period of years. Currently there are new attempts being made to feed paunch manure. For purposes of this report it is assumed that paunch manure is a waste product for which disposal is necessary.

The industry has found that the most economical acceptable way to dispose of paunch manure and pen sweepings in an area like this Study Area, is to use a sanitary landfill. Capacity to accommodate the expected quantities of meat packing industry solid waste has been included in the estimates for public sanitary landfills to be provided for present and future needs of the Study Area.

In addition to the existing meat packing industry, which changes from time to time in quantity of kill and waste produced, a new major facility is being constructed in Council Bluffs. This new industry will be completed in 1970 and is expected to kill approximately 2000 cattle per day or 572,000 head per year. This industry and public officials of Council Bluffs are planning to dispose of the paunch manure, peck manure, and pen sweepings in public sanitary landfill facilities. Estimates of these wastes are also included in estimates of required public sanitary landfill facilities.

The annual quantities of paunch manure, peck manure , and pen sweepings expected from the meat packing industry in the Study Area for disposal in a sanitary landfill are estimated to be 16,900 tons or 19,469 cubic yards (compacted). Since these quantities are estimated for the current year, no seasonal adjustment is necessary.

These quantities are based upon calculations shown in Table II-4 and were used as part of the total present quantities of commercial and industrial wastes summarized in Section H.

TABLE II-4. MEAT PACKING INDUSTRY WASTE QUANTITIES

		Annual Quantity
1.	Beef Kill:	
	a. Council Bluffs (1970)	
	2000 head per day, 5.5 days, 52 weeks	573,000 head
	b. Omaha Packing Industry	
	4895 head per day, 5.5 days, 52 weeks	1,400,000 head
2.	Paunch Manure Waste:	
	a. Council Bluffs (1970)	
	Weight @ 48 pounds per head	13,728 Tons
	Volume @ .77 cf per head	16,296 CY
	b. Omaha Packing Industry	
	Weight @ 48 pounds per head	33,600 Tons
	Volume @ .77 cf per head	39,886 CY
3.	Pen Sweeping Waste:	
	a. Council Bluffs (1970)	
	Weight @ 10% of paunch manure	1,372 Tons
	Volume @ 20% of paunch manure	2,745 CY
	b. Omaha Packing Industry	
	Weight @ 10% of paunch manure	3,360 Tons
	Volume @ 20% of paunch manure	7,977 CY

		Method
4.	Disposal of Packinghouse Waste:	
	a. Council Bluffs (1970)	
	Paunch and peck manure, pen sweepings	Sanitary Landfill
	b. Omaha Packing Industry	
	Paunch and peck manure	Internal Process
	Pen sweepings	Sanitary Landfill

	Packinghouse Waste to Sanitary Landfill:	Tons/year	CY/year
5.	a. Council Bluffs (Future)		
	Paunch and peck manure	13,728	16,296
	Pen sweepings	1,372	2,745
	b. Omaha Packing Industry		
	Pen sweepings	3,360	7,977
	Total	18,460	27,018

6. **Compaction Factor Adjustment:**

The following compaction factors were assigned to each material which adjusts the "as received" volumes to the volumes which the materials would occupy when mixed with other materials and compacted into a sanitary landfill.

TABLE II-4. MEAT PACKING INDUSTRY WASTE QUANTITIES (Cont'd)

7. Type of Waste:
Paunch and peck manure (Council Bluffs) @ .8 x 16,296 = 13,036
Pen sweepings (Council Bluffs) @ .6 x 2,745 = 1,647
Pen sweepings (Omaha) @ .6 x 7,977 = 4,786
Total 19,469 CY/year

8. A total volume of 19,469 cubic yards per year (compacted in place) represents the expected meat packing industry waste from the Omaha-Council Bluffs Metropolitan Study Area. This material increase has been projected at the same annual rate as other commercial and industrial wastes

5. Disposal of Feedlot Wastes.

a. General. The livestock feeding business has emerged from small individual farm operations to large-scale enterprises in which many thousands of animals are fed in confinement. Until the early 1950's, small-volume farmer-feeders accounted for nearly all the Study Area's livestock production. These feeders still produce more than half the livestock, but commercial lots have grown rapidly. Nationally, the number of livestock fed in large commercial lots has increased about 40% in the last four years which is approximately six times as fast as the number fed by farmer-feeders.

The shift in agriculture, and animal feeding in particular, from family-sized operations to large commercial enterprises is following the same pattern as other industry; larger operations are necessary to take advantage of mechanization, which requires specialization, management, and huge sums of capital.

b. Survey. A survey was conducted to determine the disposal methods of animal solid wastes from the various commercial feedlots in the Study Area. For purposes of this study, commercial feeding of cattle, swine, sheep and poultry is defined as those operations which feed 1,000 animals or birds at one time. The survey was limited to commercial feeders.

The purposes of the survey were to determine the current disposal methods being employed; whether the individual feed lot operators had plans for significant changes in disposal methods in the foreseeable future; and whether changes in methods might be necessary in the public interest.

There were 49 commercial feed lots in the Study Area feeding 1,000 or more head of cattle at one time. The size and number per county were as follows:

	Number of Feed Lots
Douglas County:	
1000 to 2499	6
2500 or more	10
Sarpy County:	
1000 to 2499	9
2500 or more	10
Pottawattamie County:	
1000 to 2499	12
2500 or more	2
Total Three Counties:	
1000 to 2499	27
2500 or more	22
	49

There were no commercial feed lots in the Study Area feeding 1000 or more head of swine at one time.

Data was obtained concerning sheep and poultry feeding operations. The quantity of solid waste is insignificant to the total area quantities but is included in the quantity summaries which follow.

c. Quantities. The daily production of manure from farm animals, as determined by a number of investigators in animal waste management, is approximately as shown in Table II-5.

TABLE II-5. AVERAGE DAILY MANURE PRODUCTION AND COMPOSITION

Item	Unit	Swine	Poultry	Sheep	Turkeys	Cattle
Wet Manure	Lb/d	7.0	0.25	3.0	0.75	64.0
Total Solids	%	16.0	29.0	34.0	26.0	16.0
Volatile solids	%	85	76	66.0	78	80
Nitrogen	% db	4.5	5.6	1.1	5.2	3.7
P_2O_5	% db	2.7	4.3	.3	2.8	1.1
K_2O	% db	4.3	2.0	.9	1.9	3.0

The estimated annual production of manure from feedlot animals in the Study Area is given in Table II-6. The annual production of feedlot manure was determined by multiplying the numbers and types of feedlot animals obtained in the feedlot survey by the average daily manure production given in Table II-5.

TABLE II-6. ESTIMATED ANNUAL MANURE PRODUCTION - COMMERCIAL FEED LOTS IN STUDY AREA

Livestock	No. of Animals Fed per Yr. Seasonal	Continual	Total	Animal Waste - Tons per Yr. Seasonal	Continual	Total
Cattle	12,400	243,000	255,700	59,520	1,420,872	1,480,392
Swine	0	0	0	0	0	0
Sheep	4,000	11,000	15,000	900	3,012	3,912
Poultry	30,000	37,000	67,000	562	1,688	2,250

Seasonal - refers to 1 - crop of animals fed for a period of 5 months or 150 days.
Continual - refers to 2 - crops of animals fed for a period of 1 year or 365 days.

d. Fertilizer Value. Until the development of the fertilizer industry, green plants and animal manure were the main source of supplemental plant nutrients. Today, in light of the plentiful supply of commercial fertilizers, the question has been raised if it pays to collect and use animal manure as fertilizers. An analysis of the manure and a look at the feedlot disposal methods indicate that the application of manure on soils is well justified and desired. It is justified because animal manure contains plant nutrients which have agricultural and commercial value even though, in some parts of the country the commercial value of manure cannot compete with mineral fertilizers.

If sufficient land is available, field spreading of the manure should be encouraged because it provides an adequate treatment and final disposal of the wastes at the same time.

e. Method of Animal Waste Disposal. By far the predominant method of handling feedlot manure in the Study Area is by accumulation of a manure pack, followed by field spreading. In most of the Study Area, the manure cannot be placed on the fields daily because of climatic factors, cropping practices, labor, or other reasons. Some storage is usually required, and, in many instances, this is accomplished by permitting manure to accumulate in the buildings or on feedlots.

If manure is not removed from the buildings or feedlots, bedding or litter must be used to absorb and conserve the liquid portion of the manure and to prevent the animals from getting dirty. Use of bedding or litter requires that it be handled and stored, and, in many areas, bedding material is both scarce and expensive. Consequently, there is a trend toward producing livestock without the use of bedding.

In the Study Area, manure is handled primarily with mechanical equipment. The removal and spreading of feedlot wastes is normally accomplished using tractors and manure spreaders. Equipment normally used in other farming operations is adaptable to handle feed lot waste.

Stockpiling of animal feedlot wastes followed by field spreading will continue to be the predominant method of handling and disposal for the average feedlot operator in the Study Area. All feedlot operators plan to dispose of the animal wastes by spreading the material on their own crop land, or on adjacent farm land, and to use the animal wastes as a soil conditioner or supplemental fertilizer. None of the feedlot operators propose changes in their method of animal waste disposal or expressed intent to dispose of this material in a sanitary landfill.

The present method of animal feedlot waste disposal is considered adequate for the Study Area providing that the manure stockpiles are not allowed to remain on the premises indefinitely and that field spreading is followed by discing, or plowing, in such a manner that the animal waste is thoroughly incorporated into the soil and disposed of in a nuisance free manner.

When determining the capacity of public sanitary landfills which are recommended in Parts III and IV no provision has been made to include any significant quantities of solid waste from the animal feeding industry.

The disposal of animal solid waste on land in an acceptable method but if not handled properly can result in serious water pollution problems. Water pollution caused by runoff from feedlots can be as detrimental to a receiving body of water as that resulting from the wastes from other industries and from cities. Many of the feedlots in the Study Area have grown with little planning and concern for the nuisance and pollutional characteristics of the feedlot; and have been established in areas where the capacity of streams to dilute and assimilate feedlot runoff is severely limited.

The water pollution problem associated with feedlot wastes is basically a drainage problem. As a minimum, dikes should be erected around a feedlot to protect the receiving stream from feedlot runoff. Also, rain falling outside the feedlot area should be diverted around a feedlot and kept separated from feedlot drainage. Feedlot runoff has been found to produce a slug load effect upon the receiving stream, to be high in ammonia, and to contain high bacterial counts -- all of which are detrimental to fish and animal life.

Feedlot wastes should not be discharged into public waterways unless they are pretreated sufficiently to meet the legal requirements established by the local and state public health authorities.

E. LANDFILL SURVEYS

1. General. A seven-day surveillance was established at each of seven major public disposal facilities in the Study Area. These disposal facilities were continuously manned by one or more technicians except when officially closed and secured in a manner to preclude deliveries of waste. The Omaha Incinerator and Council Bluffs Landfill which have little traffic were manned by their own employees who filled out the field data forms.

The Omaha City Dump Site and the Council Bluffs Landfill were open for 5 days per week. The remaining facilities were open 7 days per week. The sites and the dates of the survey are given in Table II-7.

TABLE II-7. DAYS AND DATES FOR LANDFILL SURVEYS

	Days						
Locations & Dates	1st	2nd	3rd	4th	5th	6th	7th
Sarpy Co. San. Landfill 9/10 to 9/15 & 9/23/68	T	W	T	F	S	S	M
Omaha Incinerator 9/13 to 9/20/68	F	S	S	M	T	W	T
Council Bluffs Landfill 9/18 to 9/24/68	W	T	F	M	T		
Douglas Co. San. L'fill 9/24 to 9/30/68	T	W	T	F	S	S	M
Meese's San. Landfill 10/2 to 10/8/68	W	T	F	S	S	M	T
Council Bluffs Dump 10/9 to 10/15/68	W	T	F	S	S	M	T
Omaha City Dump 10/21 to 10/25/68	M	T	W	T	F		

The purpose of the site surveys was to determine the quantity and characteristics of solid waste being delivered to places of disposal, plus other valuable data which could be acquired at the same time. Most of the solid waste being generated in the community must be removed from the source at regular intervals. Thus if a continuous surveillance is maintained during the course of an entire week the information acquired will be representative of the waste being generated. The data acquired must be adjusted and supplemented with other data. This data is the major source of information concerning the solid waste of the community.

Solid waste as received at a place of disposal is an extremely heterogeneous material. The usual way to determine the characteristics of the material is to analyze representative samples as received. A different approach was taken during the landfill surveys. Each load as it arrived at the disposal site was viewed and the type of material in the load recorded. Where there was a mixture of materials, an estimate of the percentage of each material was made. Certain anticipated mixtures were considered as material classifications in themselves. An explanation of the development of the unit weights for the various material classifications is included in the Appendix as Exhibit II-2.

This approach would have been impractical without the use of computers which are able to process the large quantity of information (more than 4400 loads were received and recorded). By knowing the characteristics of the materials and the total quantity of each, it is possible to make reasonably accurate estimates of the solid waste of the entire Study Area.

While the quantity and types of materials were being recorded, other information was also obtained. The nature of this information and how it was processed and used is described in the following paragraphs concerning major computer programs, and in various other sections of the report.

The data was recorded on the "Disposal Surveillance Questionnaire" which is shown in Figure II-1.

The questionnaire form and the explanation of each item is as follows:

ITEM NO. 1. BOOK NUMBER The book number was an internal processing control number and is of no importance to the data.

ITEM NO. 2. MONTH AND DAY The month of the year was recorded in spaces 4 and 5. For example, September was recorded as 09 and October as 10. Similarly, the day of the month was recorded in spaces 6 and 7. For example, the 15th day of September was recorded as 15. The year was not recorded on the forms.

ITEM NO. 3. TIME The time was recorded on a 24-hour basis in spaces 8, 9, 10 & 11; i.e. 0800 indicated 8:00 A.M. and 1310 indicated 1:10 P.M. This was the time at which the vehicle arrived at the disposal facility.

ITEM NO. 4. LICENSE CODE The state in which the vehicle was licensed was recorded in space 12. Code 1 was used for Iowa, 2 for Nebraska, and 3 for any other State or for Federal vehicles.

The number designating the Iowa or Nebraska Counties in which the vehicle was licensed was recorded in spaces 13 and 14. If this was not appropriate or if the vehicle was not licensed in Iowa or Nebraska, Code 00 was used.

ITEM NO. 5. TYPE OF VEHICLE The type of vehicle was recorded in spaces 15 and 16. If the vehicle type was not one of the nine listed, then a description of the vehicle was written in the space provided in Type 10 "Other".

Note: Vehicle type 4, or light trailer was one that could be pulled behind an automobile. For heavier trailers vehicle type 5 was used.

FIGURE II - 1 DISPOSAL SURVEILLANCE QUESTIONNAIRE — OMA-CB MAPA SOLID WASTE STUDY

BOOK NO.			MO.		DAY		TIME				LICENSE S. | CO.			VEH. TYPE			HAULER CLASSIFICATION												MAT'L (IND)		DELAY		VOLUME				WEIGHT X 10			
																	NO.		%		NO.		%		NO.		%													
1	2	3	4	5	6	7	8	9	10	11	12	13	14		15	16	17	18	19	20	21	22	23	24	25	26	27	28		29		30	31	32	33	34	35	36	37	38

ADDRESS OF SOURCE

____

____

____

____

____

LICENSE STATE: 1. IOWA, 2. NEBR., 3. OTHER

VEHICLE TYPE

1. PACKER
2. DUMP
3. VAN
4. LT. TRAILER
5. HEAVY TRA. OR SEMI
6. FLAT BED OR STAKE
7. PICK UP
8. AUTO OR STA.
9. TRANSFER TRAILER
10. OTHER __________

HAULER CLASSIFICATION

1. CONTRACTOR, GENERAL
2. CONTRACTOR, WRECKING
3. ELM TREE REMOVAL
4. COM'L. HAULER, ROUTE, DOM. ______%
5. COM'L. HAULER, ROUTE, COM'L. ______%
6. COM'L. HAULER, ROUTE, IND. ______%
7. COMMERCIAL, ONE SOURCE
8. INDUSTRIAL, ONE SOURCE
9. PUBLIC, DOMESTIC ______%
10. PUBLIC, COM'L. ______%
11. PUBLIC, IND. ______%
12. OTHER PUBLIC VEHICLE
13. PRIVATE CITIZEN, DOMESTIC

VOLUME

CY __________

% FULL __________

L __________

W __________

H __________

CONDITION OF MAT'L.

1. VERY DENSE
2. VERY LOOSE

TYPE OF MATERIAL																COORDINATE						GOV. SUBDIV.			GEO.		
MAT'L.		%		MAT'L.		%		MAT'L.		%		MAT'L.		%		SOUTH			WEST								
39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66

1. DEMOLITION-MIXED, NON-COMBUST.
2. DEMOLITION-MIXED, COMBUST.
3. DIRT, SAND OR GRAVEL
4. ROCK
5. BROKEN PAVEMENT OR SIDE WALK
6. CONSTRUCTION MIXED
7. STREET SWEEPINGS
8. CATCH BASIN CLEANINGS
9. WOOD
10. LOGS & STUMPS 10% DIA. & GREATER
11. LOGS & STUMPS LESS THAN 10" DIA.
12. LIMBS & LEAVES CHIPPED
13. LIMBS & LEAVES NOT CHIPPED

14. ELM LOGS & STUMPS, 10" D & GREATER
15. ELM LOGS & STUMPS, LESS THAN 10"
16. ELM LIMBS & LEAVES, CHIPPED
17. ELM LIMBS & LEAVES, NOT CHIPPED

18. BRUSH
19. GRASS & GARDEN TRIMMINGS

20. PAUNCH MANURE
21. PEN SWEEPINGS
22. OTHER MEAT PACKING WASTES
23. POULTRY PROCESSING WASTES
24. DEAD ANIMALS

26. TIRES & RUBBER PRODUCTS
27. PLASTIC
28. OILS, TARS & ASPHALTS (LIQUIDS)

30. BEANS OR GRAIN WASTES
31. POTATO PROCESSING WASTES
32. OTHER FOOD PROCESSING WASTE
33. FRUITS & VEGTABLES

35. ASHES AND CINDERS
36. FLY ASH
37. CEMENT INDUSTRY WASTE
38. OTHER FINE PARTICLES

40. GARBAGE & KITCHEN WASTE, DOMESTIC
41. GARBAGE & KITCHEN WASTE, COM'L
42. MIXED TRASH & REFUSE (INCL. GARB.)
43. MIXED TRASH & REFUSE (NO GARBAGE)

44. INCINERATOR RESIDUE DOMESTIC
45. INCINERATOR RESIDUE, COM'L & IND.
46. INCINERATOR RESIDUE, MUNICIPAL

50. PAPER & CARDBOARD
51. CANS
52. FURNITURE COMBUST.
53. FURNITURE

54. MAJOR APPLIANCES
55. HEAVY METAL SCRAP
56. LIGHT METAL SCRAP
57. WOOD CRATES
58. GLASS AND BOTTLES
59. BATTERY CASE & AUTOMOTIVE
60. AUTOMOBILE BODIES
61. WIRE
62. CHEMICAL WASTE, DRY
63. CHEM. WASTE, LIQ. OR WET

70. SEWAGE SLUDGE SOLIDS
71. SEWAGE GRIT
72. SEWAGE SCREENINGS
73. SEWAGE GREASE SKIMMINGS

80. AGRICULTURAL WASTE

ITEM NO. 6. TYPE OF HAULER The type of hauler delivering material to the disposal facility was recorded in spaces 17 and 18 if entirely of one hauler classification, and 21 and 22, and possibly 25 and 26, if the hauler was a combination of hauler classifications. If the hauler was entirely of one classification no percent was recorded in blank marked %. The computer automatically listed 100%.

If the hauler was a contractor delivering general construction wastes to the disposal facility, hauler classification 1 in space 18 was used. Similarly, if the contractor was delivering wrecking or demolition wastes, hauler classification 2 in space 18 was used. Any hauler regardless of his type, hauling elm tree removal material to the disposal facility was coded using hauler classification 3 in space 18.

If the hauler was a commercial hauler, operating a route, hauler classification 4 or 5 or 6 or a combination of these numbers, or all of these numbers was used as appropriate. For example, if the load was all domestic material, hauler classification 4 in space 18 was used. Similarly, hauler classification 5 or 6 was used if the material was all commercial or all industrial. Whenever the commercial hauler delivered a combination of domestic, commercial, and/or industrial wastes, both the numbers indicating hauler classifications and the percentages of each was used, using the spaces marked %. If the waste was entirely of one hauler classification, the computer printed out 100%; therefore, no percentage was recorded in spaces marked %.

If the hauler was delivering commercial waste of one source, hauler classification 7 or 8 was used as appropriate in space 18.

If the haulers were public vehicles or contractor's vehicles which were hired by a municipality for collection and disposal of solid wastes, hauler classification 9 or 10 or 11 or a combination of these numbers, or all of these numbers was used as appropriate. For example, if the load was all domestic material, hauler classification 9 in space 18 was used. Similarly, if the material was all commercial or all industrial, hauler classification 10 or 11 in spaces 17 and 18 was used. Whenever the hauler delivered a combination of domestic, commercial, and/or industrial wastes both the numbers indicating hauler classifications and the percentages of each was recorded using the spaces marked %. If the waste was entirely of one hauler classification, the computer printed out 100%; therefore, no percentage recorded in spaces marked % was required.

If the hauler was any other public vehicle, hauler classification 12 in spaces 17 and 18 was used.

If the hauler was a private citizen delivering domestic waste from his own dwelling, hauler classification 13 in spaces 17 and 18 was used. Dwellings included living units and associated yards. If a private citizen delivered other than domestic waste, it was necessary to select one of the other code numbers as appropriate hauler classification.

ITEM NO. 7. CONDITION OF MATERIAL The unusual condition of waste delivered to the disposal facility was recorded in space 29. For example, in most wrecking jobs the refuse is usually piled in dump trucks with a clam shell or front end loader. The engineer who evaluated the survey sheets took this into account; however, if a truck load of waste from a wrecking job was hand loaded allowing much more than the usual amount to be loaded in the truck, a very dense condition was indicated by placing a "1" in space 29. Similarly, if a load of large cardboard boxes was loose and not in any way crushed or packed, a very loose condition was indicated by placing a "2" in space 29. Normally, no numbers appear in space 29. It was used only for the unusual condition.

ITEM NO. 8. BULKY Bulky material was indicated by recording the number "1" in space 30. Material not bulky was indicated by leaving space 30 blank. Bulky material includes items larger than or as large as a desk or refrigerator, and pieces greater than 12' long other than a simple 2 x 4 or easily broken items. In general, a bulky item was one that could not easily be crushed or broken with a small farm tractor.

ITEM NO. 9. SIZE OF LOAD The size of load or volume was recorded in one of three ways.

The first way was to indicate the size of load by recording the size of vehicle cargo space in cubic yards and percent to which it was filled. For example, a dump truck with a 5 CY capacity box filled half full of tin cans was recorded as 5 CY x 50% full. The same truck with tree limbs piled higher than the side of the 5 CY box was recorded as 5 CY x 120% full.

The second way was to indicate the size of load by recording the length, width, and height of the vehicle box or cargo space, in feet and percent to which the vehicle was filled. For example, a pick-up truck with a box 8' long x 4' wide x 4' high filled one-half full of tin cans was recorded as 8' long x 4' wide x 4' high x 50% full. CY was left blank.

The third way was to indicate the size of load by measuring the length, width, and height of the actual cargo in feet. For example, a flat bed truck might have a load of scrap concrete blocks piled an average of 8' long x 4' wide x 2' high; or an automobile with a basket of grass clippings in the trunk was described as a pile 2' long x 2' wide x 1' high. Since this method indicated size of cargo and not size of vehicle, the % full was left blank.

ITEM NO. 10. WEIGHT The weight of the load was recorded in spaces 35, 36, 37 and 38, when provision was made for weighing of the vehicle. The weight was written in multiples of 10. For example, a load weighing 10,000 lbs. was recorded as 1,000.

ITEM NO. 11. ADDRESS OF SOURCE The address from which the source of waste originated was recorded in the blanks provided. For example, if a contractor were wrecking a hotel building in the 3900 block on Farnam Street, "39th and Farnam, Omaha" was recorded. For city refuse vehicles, the approximate center of the route was indicated.

ITEM NO. 12. TYPE OF MATERIAL The type of material being delivered was indicated by recording one or more of the types of material listed in one or more of the material spaces provided. If a load was mixed and had a high percentage of some materials and a low percentage of others, a rough approximation of the percentages was recorded. For example, a load of bricks from a wrecking job with some wood would have been recorded as follows:

TYPE OF MATERIAL

Mat'l		%		Mat'l		%		Mat'l		%		Mat'l		%	
39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	1	9	0		2	1	0								

1. Demolition - Mixed, Non-Combust.
2. Demolition - Mixed, Combust.

In the case of a typical load from a City Refuse Packer Truck, "40. Garbage and Kitchen Waste, Domestic", or "42. Mixed Trash and Refuse Including Garbage" was indicated, but no attempt was made to evaluate the percentage of any of the materials in the load. "6. Construction Mixed" indicated any scrap materials or other materials derived from the construction industry which did not fall into other specific categories listed. "Ashes and Cinders" designated the normal residue and clinkers from burning of coal and other combustibles as opposed to "Fly Ash" which designated very fine, light material.

ITEM NO. 13. COORDINATE, GOVERNMENT SUBDIVISION, AND GEOGRAPHIC AREA The coordinate of the source of waste, the government subdivision and geographic area were determined in the office by the person processing the survey sheets. No entries were made in spaces 55 through 66 by surveillance field personnel.

A map of the Study Area was divided into 1,000 foot grids numbering south from a zero grid line (which ran east and west) at Latitude 42°00'00". Each grid line south of this zero grid represented a 1,000' distance. West Dodge Road in the vicinity of Boys Town is approximately 296,000 ft. south of the zero grid and is referred to as S296.

The other direction in the grid system was numbered west of a zero grid line (which ran north and south) at Longitude 94°00'00". Each grid line west of this zero grid represents a 1,000' distance. Seventy-Second Street in Omaha is approximately 556,000 feet west of the zero grid and is referred to as W556.

The address of the source of a load which is explained above in Item No. 11 was found on a grid map of the Study Area. This address was converted to grid coordinates and listed in spaces 55 through 60 using the closest grid lines both south and west.

At the same time the address was coded for coordinates, the political subdivision was recorded in spaces 61 through 63. A listing of the political subdivisions which appeared during the survey is shown in Figure II-11.

The Study Area was also divided into geographic areas which were land masses representing areas 15,000 feet square in the urban areas and 25,000 ft. square in the rural areas. A further discussion pertaining to geographic areas is found in Part III.

The landfill surveys were scheduled to avoid unusual conditions. Weeks containing holidays were avoided. Whenever a holiday fell on or near a weekend the surveys were delayed beyond the weekend to avoid recording accumulations due to the holiday. Similarly, weather conditions were considered. Where rain and wet weather became a possible factor, the survey in progress was abandoned and restarted after the weather and site conditions had improved. Each site survey covered a typical work week free of disruptive conditions.

2. Computer Programs

a. General. In all of the programs certain terminology is used which must be understood. The reader is cautioned to be certain the right data is selected and the right conditions and units are used. The terminology is not difficult or profound; it is tedious. Reference will be made to computer programs by program designations A, B, C, D, E, F, etc. For example: Program D, "As Received Quantities of Refuse by Type of Vehicle and by Geographic Area" was produced in eight variations by sorting the data into eight different groups or combinations. There was one sort for each of the seven sites representing one week at each site and one additional sort which produced the total for all sites. When sorted by the entire week, the totals are per week. The week may be seasonally adjusted to convert the raw data to a typical week, but in each case it is labeled to reflect the true conditions. There are certain special cases where this procedure is changed; but in each case the data is properly marked to reflect the true conditions.

Before any programs were run, all of the data was tested in specific test programs to find potential errors. In total there were eight sorts for Program A through N; one for each survey site and one for the total of all sites for a final total of 112 sorts. All of the data is not reproduced in this report because of the volume of material. Certain portions have been reproduced where appropriate. In general, the data reproduced is that showing the total for all facilities for each program. The entire data is available for interested persons.

Not all of the data in all of the sorts was used in the analysis of the problems peculiar to this Study Area. In some cases the data was produced for the benefit of researchers who may have use for the data not previously available. The various combinations of data in some cases were the result of simply leaving a computer sub-program in a main program, and acquiring basic data as a byproduct while obtaining certain required information. We have tried to describe the data, how and under what conditions it was gathered, and how it was adjusted, to make this information as useful as possible to others with similar problems. We have attempted to produce data and report exactly the source and conditions both for our use and for the use of others as it may apply.

The basic surveillance data for Programs A through N was processed on an IBM 360 Model 65 Computer with a 256K core storage locations memory. The data was established on cards and then converted to magnetic tape for processing.

The terms which are common to several programs are explained as follows:

(1) Cubic Yards as Received. These are the cubic yards of material appearing in Columns 31-34 of the survey form. They are not adjusted for seasonal or compaction factors. They are adjusted for Condition of Material as indicated in Column 29 of the survey form.

(2) Packer Truck Factor. When material is delivered in a packer truck, the material is precompacted to the extent that the material would have a greater unit weight and greater compaction than if delivered loose. The unit weights and compaction factors for each material were assigned on the basis of loose material. When material is delivered in a packer truck,the unit weight and the compaction factor are multiplied by two. The weight is therefore, doubled to reflect the true weight in the truck contents. In those programs where volumes are adjusted for compaction, the volume in a packer truck is doubled.

(3) Pounds as Received. The same as "Cubic Yards as Received" except the volume of each material on each load was multiplied by the appropriate unit weight for that particular material to convert from cubic yards to pounds. The unit weights used are shown in Table II-8.

(4) Vehicles or Vehicles this Hour. This is simply a count of the vehicles for the appropriate unit of time or type of vehicle.

(5) Seasonal Factor Adjustment. A factor was assigned to each material which would adjust the amount of material received during the day or week to the average daily or 7-day rate which would be experienced over the entire year. The factors are shown in Table II-23.

(6) Compaction Factor Adjustment. A factor was assigned to each material which would adjust the material received during the day or week to reduce its volume "as received" to the volume which it would occupy when mixed with other materials and was compacted into a landfill. Cover dirt is not included. See Table II-23.

(7) Condition of Material. The unusual condition of waste delivered to the disposal facility was recorded in space 29. For example, in most wrecking jobs the refuse is usually piled in dump trucks with a clam shell or front end loader. The Engineer evaluating these survey sheets has taken this into account when assigning unit weights; a truck load of waste from a wrecking job was hand loaded allowing much more than the usual amount to be loaded in the truck, a very dense condition was indicated by placing a "1" in space 29. Similarly, if a load of large cardboard boxes were loose and not in any way crushed or packed, a very loose condition was indicated by placing a "2" in space 29. Normally, no numbers appear in space 29. It was used only for the unusual condition.

TABLE II-8. MATERIALS, SEASONAL FACTORS, COMPACTION FACTORS AND UNIT WEIGHTS

Material Code	Seasonal Factor	Comp. Factor	Unit Weight (Loose)	Material
1	0.6	0.8	2,400	Demo-Mixed Non-Combustible
2	0.6	0.7	600	Demo-Mixed Combustible
3	0.6	0.8	2,430	Dirt, Sand or Gravel
4	0.6	0.6	2,430	Rock
5	0.6	0.7	2,560	Broken Pavement or Sidewalk
6	0.6	0.7	1,620	Construction Mixed
7	0.7	0.9	2,300	Street Sweepings
8	0.7	0.9	2,430	Catch Basin Cleanings
9	1.0	0.5	810	Wood
10	0.9	0.5	675	Logs 10 inch diameter and greater
11	0.9	0.5	675	Logs and stumps less than 10 inch.
12	0.6	0.4	320	Limbs and leaves chipped
13	0.6	0.3	270	Limbs and leaves not chipped
14	0.8	0.5	675	Elm logs 10-inch diameter and greater
15	0.8	0.5	675	Elm logs less than 10-inch
16	0.8	0.4	320	Elm limbs and leaves chipped
17	0.8	0.3	270	Elm limbs and leaves, not chipped
18	0.1	0.1	54	Brush
19	0.6	0.2	218	Grass and garden trimmings
20	1.0	0.8	1,730	Paunch manure
21	1.5	0.6	1,090	Pen sweepings
22	1.0	0.8	1,730	Other meat packing wastes
23	1.0	0.8	1,730	Poultry processing wastes
24	1.0	0.8	600	Dead animals
25	1.0	0.5	4,644	Slag
26	1.0	0.2	400	Tires and rubber products
27	1.0	0.1	60	Plastic
28	0.8	0.1	1,620	Oils, tars and asphalts - liquid
30	1.0	0.8	1,300	Beans or grain wastes
31	1.0	0.8	1,130	Potato processing wastes
32	1.0	0.6	540	Other food processing waste
33	0.8	0.5	950	Fruits and vegetables
35	2.0	0.9	1,220	Ashes and cinders
36	1.0	1.0	2,160	Fly ash
37	1.0	1.0	2,400	Cement industry waste
38	1.0	0.9	1,620	Other fine particles
40	0.9	0.3	313	Garbage and kitchen waste - Domestic
41	0.9	0.3	313	Garbage and kitchen waste - Commercial
42	0.9	0.2	308	Mixed trash & refuse - incl. garbage
43	0.9	0.2	232	Mixed trash & refuse - No garbage
44	1.0	0.7	810	Incinerator residue - Domestic
45	1.0	0.7	810	Incinerator residue, comm. & industrial
46	1.0	0.7	810	Incinerator residue, municipal
50	1.0	0.2	185	Paper and cardboard
51	1.0	0.2	160	Cans
52	1.0	0.2	80	Furniture combustible
53	1.0	0.2	80	Furniture
54	1.0	0.2	300	Major appliances
55	1.0	0.9	4,050	Heavy metal scrap
56	1.0	0.3	1,350	Light metal scrap
57	1.0	0.5	182	Wood Crates
58	1.0	0.9	700	Glass and bottles
59	1.0	0.9	1,200	Battery case and automotive
60	1.0	0.3	216	Automobile bodies
61	1.0	0.2	540	Wire
62	1.0	0.9	1,080	Chemical Waste, dry
63	1.0	0.1	1,620	Chemical waste, liquid or wet
70	1.0	0.9	1,750	Sewage Sludge Solids
71	1.0	0.9	2,200	Sewage grit
72	1.0	0.9	1,600	Sewage screenings
73	1.0	0.9	1,600	Sewage grease skimmings
80	0.3	0.6	950	Agricultural waste

(8) Bulky. Bulky material was indicated by recording the number "1" in space 30. Material not bulky was indicated by leaving space 30 blank. Bulky material includes items as large as or larger than a desk or refrigerator, and pieces greater than 12' long other than a simple 2 x 4 or easily broken items. In general, items that could not easily be crushed or broken with a small farm tractor are considered as bulky.

(9) All pounds as listed in Programs A through N and shown in Tables II-9 through 22 are 100 pounds. Multiply all pounds as listed by 100.

(10) Other terms are explained in the program description where they are used.

b. Computer Program A. "Quantity of Refuse by Disposal Process and by Material Classification." In this program materials were sorted by material classification and by potential disposal process. Five potential disposal processes were considered. Each load was examined by the computer and compared to a set of instructions which determined if that load could be accepted by the process. If it could, the load was recorded for the process. If it could not, the load was recorded in the space next to that process marked "To Landfill" or "Not for__________" as appropriate. For example, a load of broken pavement would be accepted at a sanitary landfill and so recorded. When considered for incineration, it would be rejected and sent to "To Landfill". When considered for composting, it would be rejected and sent to "To Landfill." As soon as one potential process was completed, the next process was considered. The load is included in all five processes.

The Sanitary Landfill Process would accept all materials and is the same "As Received CY" and "As Received Pounds" except the cubic yards have been adjusted for compaction and seasonal variation, and the pounds have been adjusted for seasonal variation only.

The Incineration Process - All loads and each material content of a load were checked to determine if the load could be accepted at an incinerator or should be diverted to a sanitary landfill. Loads consisting of materials 2, 9, 11, 12, 13, 15 through 33; 40 through 44; 50, 52, 57, 59, 62, 70, 71, 72, 73, and 80, would be accepted. Other loads containing less than 25% of the materials not listed above would be accepted. All other loads would be diverted from the incinerator to a sanitary landfill. On this basis, two sets of data were determined; ie., "To Incineration" and "To Landfill." In each of these two main classifications the material is shown in cubic yards and pounds. They are adjusted for seasonal factor and for compaction factor, where appropriate.

The Dry Landfill - All loads and each material content of a load were checked to determine if the load could be dumped in a dry landfill site. This site would be similar to a sanitary landfill but would be one which would not require the same degree of care in handling and covering to protect the community from rats, odors, gases, unsightly refuse and insects. It could be a gulley or low area in town where filling was desired. Material which could not be dumped in a dry landfill would be diverted to a sanitary landfill site for disposal. Loads consisting of materials 1, 3, 4, 5, 7, 8, 10 through 17 and 35, 36 and 37 would be accepted. All other loads would be diverted to a sanitary landfill. On this basis, two sets of data were determined; i.e. "To Dry Landfill" and "Not to Dry Landfill." This latter set would be to Sanitary Landfill. In each of these two main classifications, the material is shown in cubic yards and pounds. They are adjusted for seasonal factor and for compaction factor, where appropriate.

The Wet Landfill - All loads and each material content of a load were checked to determine if the load could be dumped in a wet landfill site. This site would be similar to a worked out quarry where there was standing water or any other site subject to ground water saturation where contamination of ground water through leaching could occur. Material which could not be dumped into such a wet landfill would be diverted to a sanitary landfill for disposal. Loads consisting of Materials 1, 3, 4 and 5 would be accepted. All other loads would be diverted to a sanitary landfill. On this basis, two sets of data were determined; i.e., "To Wet Landfill" and "Not to Wet Landfill." In each of these two main classifications, the material is shown in cubic yards and pounds. They are adjusted for seasonal factors and compaction factors where appropriate.

Program A was run for the totals for each facility; and the totals for all facilities. The totals for all facilities are shown in Table II-9.

c. Computer Program B. "As Received" quantities of refuse by vehicle and by hours of the day. In this program the "As Received" quantities are sorted by type of vehicle and by hours of the day. The program is self-explanatory except to note that the quantities in both cubic yards and pounds and the number of vehicles are not adjusted for seasonal or compaction factors. This is true for all programs A through N, except for A, I, J and K which are properly noted as being adjusted.

Program B was run for each facility and a total of all facilities. The run containing all facilities is shown in Table II-10.

TABLE II-9 COMPUTER PROGRAM A.

TOTAL FOR ALL FACILITIES

QUANTITY OF REFUSE BY DISPOSAL PROCESS AND BY MATERIAL CLASSIFICATION, FOR ALL DAYS

CODE	MATERIAL DESCRIPTION	SANITARY LAND FILL		INCINERATION				COMPOSTING				DRY LAND FILL				WET LAND FILL			
				TO INCINERATOR		TO LAND FILL		TO COMPOSING		TO LAND FILL		MATL FOR DRY FILL		MATL NOT FOR DRY LF		MATL FOR WET FILL		MATL NOT FOR WET LF	
		CU YDS**	POUNDS*	CU YDS*	POUNDS*	CU YDS**	POUNDS	CU YDS*	POUNDS*	CU YDS**	POUNDS*	CU YDS**	POUNDS*	CU YDS**	POUNDS*	CU YDS**	POUNDS*	CU YDS**	POUNDS*
1	DEMO-MIXED NON COMBUST	93.	2800.	6.	136.	89.	2663.	0.	0.	93.	2800.	105.	2514.	10.	285.	105.	2514.	16.	285.
2	DEMO-MIXED COMBUSTABLE	235.	2012.	324.	1946.	8.	66.	319.	1912.	12.	100.	0.	0.	235.	2012.	0.	0.	235.	2012.
3	DIRT SAND OR GRAVEL	555.	16862.	1.	19.	555.	16844.	0.	0.	555.	16862.	687.	16687.	8.	175.	685.	16643.	7.	220.
4	ROCK	20.	806.	0.	0.	20.	806.	0.	0.	20.	806.	32.	782.	1.	24.	32.	762.	1.	24.
5	BROKEN PAVEMENT OR SIDE WALK	226.	8280.	1.	36.	225.	8244.	0.	0.	226.	8280.	411.	7952.	9.	328.	307.	7862.	11.	418.
6	CONSTRUCTION MIXED	511.	11826.	2.	30.	510.	11755.	0.	0.	511.	11826.	0.	0.	511.	11826.	0.	0.	511.	11826.
7	STREET SWEEPINGS	147.	3747.	0.	0.	147.	3747.	0.	0.	147.	3747.	163.	3747.	0.	0.	163.	3747.	0.	0.
8	CATCH BASIN CLEANINGS	81.	2177.	0.	0.	81.	2177.	0.	0.	81.	2177.	87.	2117.	2.	60.	87.	2117.	2.	60.
9	WOOD	148.	2396.	284.	2297.	6.	100.	257.	2084.	19.	312.	0.	0.	148.	2396.	0.	0.	148.	2396.
10	LOGS 10 INCH DIA & GREATER	57.	767.	0.	0.	57.	767.	0.	0.	57.	767.	114.	767.	0.	0.	0.	0.	57.	767.
11	LOGS & STUMPS LESS THAN 10 IN	39.	527.	78.	527.	0.	0.	78.	527.	0.	0.	77.	517.	1.	10.	0.	0.	39.	527.
12	LIMBS & LEAVES CHIPPED	11.	84.	26.	84.	0.	0.	26.	84.	0.	0.	23.	72.	2.	12.	0.	0.	11.	84.
13	LIMBS & LEAVES NOT CHIPPED	173.	1556.	571.	1541.	7.	15.	555.	1510.	5.	46.	527.	1423.	15.	133.	0.	0.	173.	1556.
14	ELM LOGS 10 INCH DIA & GREATER	216.	2918.	12.	80.	210.	2639.	0.	0.	216.	2916.	420.	2835.	6.	83.	0.	0.	216.	2918.
15	ELM LOGS LESS THAN 10 INCH	104.	1403.	199.	1340.	5.	63.	191.	1292.	8.	111.	207.	1397.	0.	6.	0.	0.	104.	1403.
16	ELM LIMBS & LEAVES CHIPPED	83.	667.	208.	667.	0.	0.	208.	667.	0.	0.	208.	667.	0.	0.	0.	0.	83.	667.
17	ELM LIMBS & LEAVES, NOT CHIP	281.	2529.	841.	2325.	23.	205.	805.	2228.	34.	302.	901.	2486.	5.	43.	0.	0.	281.	2529.
18	BRUSH	8.	42.	75.	41.	0.	1.	73.	40.	0.	2.	0.	0.	8.	42.	0.	0.	8.	42.
19	GRASS & GARDEN TRIMMINGS	78.	848.	373.	835.	1.	14.	362.	810.	4.	39.	0.	0.	78.	846.	0.	0.	78.	848.
20	PAUNCH MANURE	48.	1048.	41.	1048.	0.	0.	41.	1040.	0.	0.	0.	0.	48.	1040.	0.	0.	48.	1048.
21	PEN SWEEPINGS	506.	9187.	426.	9187.	0.	0.	426.	9187.	0.	0.	0.	0.	506.	9187.	0.	0.	506.	9187.
22	OTHER MEAT PACKING WASTES	2.	52.	3.	52.	0.	0.	3.	52.	0.	0.	0.	0.	2.	52.	0.	0.	2.	52.
24	DEAD ANIMALS	8.	64.	11.	64.	0.	0.	11.	64.	0.	0.	0.	0.	8.	64.	0.	0.	8.	64.
25	SLAG	28.	2559.	0.	0.	28.	2559.	0.	0.	28.	2559.	0.	0.	28.	2559.	0.	0.	28.	2559.
26	TIRES & RUBBER PRODUCTS	55.	1106.	232.	1043.	3.	64.	0.	0.	55.	1106.	0.	0.	55.	1106.	0.	0.	55.	1106.
27	PLASTIC	32.	190.	294.	190.	0.	0.	0.	0.	32.	190.	0.	0.	32.	190.	0.	0.	32.	190.
28	OILS, TARS & ASPHALTS-LIQUID-	9.	1433.	88.	1433.	0.	0.	0.	0.	9.	1433.	0.	0.	9.	1433.	0.	0.	9.	1433.
30	BEANS OR GRAIN WASTES	36.	578.	44.	578.	0.	0.	2.	34.	33.	544.	0.	0.	36.	578.	0.	0.	36.	578.
32	OTHER FOOD PROCESSING WASTE	138.	1242.	115.	1242.	0.	0.	35.	373.	97.	869.	0.	0.	138.	1242.	0.	0.	138.	1242.
33	FRUITS & VEGTABLES	25.	479.	30.	418.	3.	61.	4.	41.	23.	436.	0.	0.	25.	479.	0.	0.	25.	479.
35	ASHES & CINDERS	894.	12125.	1.	13.	893.	12112.	1.	10.	894.	12115.	963.	11500.	46.	625.	937.	11428.	51.	696.
38	OTHER FINE PARTICLES	6.	115.	0.	0.	6.	115.	0.	0.	6.	115.	0.	0.	6.	115.	0.	0.	6.	115.
40	GARBAGE & KITCHEN WASTE -DOM-	393.	4097.	672.	4097.	0.	0.	672.	4097.	0.	0.	0.	0.	393.	4097.	0.	0.	393.	4097.
41	GARBAGE & KITCHEN WASTE -COML-	87.	912.	153.	912.	0.	0.	153.	912.	0.	0.	0.	0.	87.	912.	0.	0.	87.	912.
42	MIXED TRASH & REFUSE-INCL GARB	3004.	46264.	8330.	46232.	2.	33.	8248.	45782.	31.	483.	0.	0.	3004.	46266.	0.	0.	3004.	46266.
43	MIXED TRASH & REFUSE -NO GARB-	1357.	15747.	5096.	15421.	28.	326.	4547.	15050.	60.	658.	0.	0.	1358.	15747.	0.	0.	1358.	15747.
44	INCINERATOR RESIDUE -DOM-	8.	96.	0.	0.	8.	56.	0.	0.	8.	56.	0.	0.	8.	96.	0.	0.	8.	96.
45	INCINERATOR RESIDUE,COML & IND	4.	48.	0.	0.	4.	48.	0.	0.	4.	48.	0.	0.	4.	48.	0.	0.	4.	48.
46	INCINERATOR RESIDUE,MUNICIPAL	3.	38.	0.	0.	3.	38.	0.	0.	3.	38.	0.	0.	3.	38.	0.	0.	3.	38.
50	PAPER & CARDBOARD	1922.	17783.	7654.	16997.	85.	786.	7323.	16143.	177.	1640.	0.	0.	1923.	17784.	0.	0.	1923.	17784.
51	CANS	131.	1050.	96.	276.	97.	774.	0.	0.	131.	1045.	0.	0.	131.	1050.	0.	0.	131.	1090.
52	FURNITURE COMBUST.	32.	128.	149.	119.	2.	8.	148.	119.	2.	9.	0.	0.	32.	128.	0.	0.	32.	128.
53	FURNITURE	77.	306.	30.	24.	70.	282.	0.	0.	70.	306.	0.	0.	77.	306.	0.	0.	77.	306.
54	MAJOR APPLIANCES	46.	697.	13.	38.	44.	660.	1.	2.	46.	656.	0.	0.	46.	697.	0.	0.	46.	697.
55	HEAVY METAL SCRAP	126.	5651.	6.	253.	120.	5398.	0.	0.	126.	5651.	0.	0.	126.	5651.	0.	0.	126.	5651.
56	LIGHT METAL SCRAP	145.	6514.	32.	516.	133.	5958.	1.	15.	144.	6499.	0.	0.	145.	6514.	0.	0.	145.	6514.
57	WOOD CRATES	756.	2751.	1363.	2667.	23.	85.	1205.	2467.	78.	285.	0.	0.	756.	2751.	0.	0.	756.	2751.
58	GLASS & BOTTLES	91.	706.	2.	12.	89.	694.	0.	0.	91.	706.	0.	0.	91.	706.	0.	0.	91.	706.
59	BATTERY CASE & AUTOMOTIVE	94.	1260.	104.	1245.	1.	15.	0.	0.	94.	1260.	0.	0.	94.	1260.	0.	0.	94.	1260.
60	AUTOMOBILE BODIES	11.	77.	0.	0.	11.	77.	0.	0.	11.	77.	0.	0.	11.	77.	0.	0.	11.	77.
61	WIRE	16.	430.	53.	286.	5.	144.	0.	5.	16.	430.	0.	0.	16.	430.	0.	0.	16.	430.
62	CHEMICAL WASTE, DRY	33.	393.	31.	393.	0.	0.	0.	0.	33.	393.	0.	0.	33.	393.	0.	0.	33.	393.
63	CHEMICAL WASTE, LIQ OR WET	27.	4319.	0.	0.	27.	4319.	0.	0.	27.	4319.	0.	0.	27.	4319.	0.	0.	27.	4319.
70	SEWAGE SLUDGE SOLIDS	56.	1090.	67.	1090.	0.	0.	62.	1090.	0.	0.	0.	0.	56.	1090.	0.	0.	56.	1090.
71	SEWAGE GRIT	19.	462.	1.	462.	0.	0.	21.	462.	0.	0.	0.	0.	19.	462.	0.	0.	19.	462.
72	SEWAGE SCREENINGS	17.	298.	15.	242.	3.	56.	15.	242.	3.	56.	0.	0.	17.	298.	0.	0.	17.	298.
80	AGRICULTURAL WASTE	13.	213.	15.	213.	0.	0.	15.	213.	0.	0.	0.	0.	13.	213.	0.	0.	13.	213.
	TOTALS	13319.	207727.	29081.	118662.	3628.	85089.	26292.	108551.	4328.	95202.	4803.	55464.	10443.	148287.	2316.	45092.	11387.	158659.

* ADJUSTED FOR SEASONAL FACTORS
** ADJUSTED FOR SEASONAL AND COMPACTION FACTORS

TABLE II-10 COMPUTER PROGRAM B.

TOTAL FOR ALL FACILITIES

AS RECEIVED QUANTITIES OF REFUSE BY TYPE OF VEHICLE, AND BY HOURS OF THE DAY, FOR ALL DAYS

TOTALS AS RECEIVED

HOUR	PACKER			DUMP			VAN			LIGHT TRAILER			HEAVY TRAILER		
	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100	0.	0.	0.	46.	101.	5.	0.	0.	0.	0.	0.	0.	0.	0.	0.
200	16.	59.	1.	50.	115.	8.	0.	0.	0.	0.	0.	0.	0.	0.	0.
300	32.	137.	2.	92.	207.	11.	0.	0.	0.	0.	0.	0.	0.	0.	0.
400	68.	295.	5.	53.	230.	9.	0.	0.	0.	0.	0.	0.	0.	0.	0.
500	26.	121.	2.	55.	244.	9.	0.	0.	0.	0.	0.	0.	0.	0.	0.
600	44.	232.	3.	60.	685.	10.	7.	16.	2.	0.	0.	0.	0.	0.	0.
700	300.	1583.	19.	78.	335.	10.	72.	133.	5.	0.	0.	0.	21.	39.	1.
800	586.	3494.	35.	472.	5877.	58.	300.	643.	17.	5.	19.	3.	182.	231.	3.
900	710.	4433.	44.	541.	7204.	70.	352.	745.	27.	6.	13.	3.	143.	705.	4.
1000	1198.	7449.	76.	636.	10551.	71.	606.	1612.	49.	42.	228.	9.	131.	257.	3.
1100	1513.	9553.	91.	676.	11731.	83.	501.	1181.	38.	36.	118.	10.	187.	463.	5.
1200	1943.	11464.	122.	453.	5162.	55.	281.	613.	21.	24.	142.	9.	9.	20.	1.
1300	1718.	10484.	104.	571.	7766.	65.	309.	594.	19.	45.	239.	14.	146.	279.	5.
1400	1405.	8220.	88.	651.	7304.	82.	545.	1428.	36.	69.	191.	18.	263.	883.	9.
1500	1399.	9883.	86.	596.	7312.	74.	572.	1395.	40.	83.	277.	24.	143.	280.	6.
1600	883.	4927.	56.	269.	4607.	32.	469.	1950.	35.	40.	201.	13.	71.	179.	6.
1700	475.	3980.	29.	164.	1695.	15.	24.	64.	5.	15.	41.	6.	83.	159.	4.
1800	158.	1469.	10.	18.	430.	1.	5.	129.	1.	3.	6.	2.	12.	30.	1.
1900	64.	431.	4.	3.	7.	1.	21.	48.	1.	0.	0.	0.	0.	0.	0
2000	16.	74.	1.	10.	77.	1.	6.	15.	1.	0.	0.	0.	0.	0.	0.
2100	16.	79.	1.	0.	0.	0.	19.	36.	2.	0.	0.	0.	0.	0.	0.
2200	16.	108.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2300	16.	99.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTALS	12602.	78572.	781.	5578.	71747.	674.									
							4089.	10601.	299.	312.	1476.	111.	1390.	3526.	48.
AVERAGE PER VEHICLE	16.	101.	0.	6.	106.	0.									
							14.	35.	0.	3.	13.	0.	29.	73.	0.

TIME	FLAT BED			PICK UP			AUTO			TRANSFER VEHICLE			OTHER		
	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
200	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
300	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
400	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
500	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
600	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
700	319.	1206.	12.	25.	107.	3.	0.	1.	2.	0.	0.	0.	0.	0.	0.
800	741.	4510.	49.	204.	734.	42.	4.	13.	10.	0.	0.	0.	20.	324.	1.
900	704.	3351.	41.	478.	2072.	108.	15.	43.	37.	0.	0.	0.	29.	462.	3.
1000	831.	5005.	56.	668.	2946.	139.	37.	108.	56.	0.	0.	0.	16.	259.	1.
1100	753.	4877.	58.	963.	4058.	203.	49.	128.	78.	44.	80.	1.	0.	0.	0.
1200	798.	3857.	52.	642.	2794.	128.	46.	178.	69.	0.	0.	0.	10.	154.	1.
1300	803.	4383.	51.	612.	2421.	139.	44.	224.	92.	0.	0.	0.	24.	319.	3.
1400	866.	5402.	52.	693.	2873.	144.	47.	116.	78.	0.	0.	0.	0.	0.	0.
1500	898.	4312.	57.	864.	3512.	180.	60.	174.	98.	0.	0.	0.	21.	345.	1.
1600	657.	3343.	47.	693.	3268.	143.	47.	132.	80.	0.	0.	0.	0.	0.	0.
1700	431.	1659.	26.	433.	1659.	85.	32.	94.	54.	0.	0.	0.	0.	0.	0.
1800	97.	253.	7.	105.	238.	19.	2.	14.	8.	0.	0.	0.	0.	0.	0.
1900	0.	0.	0.	7.	16.	2.	0.	1.	2.	0.	0.	0.	0.	0.	0.
2000	0.	0.	0.	9.	22.	2.	1.	2.	2.	0.	0.	0.	0.	0.	0.
2100	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.	0.	0.	0.	0.	0.
2200	0.	0.	0.	0.	0.	7.	13.	2.	1.	1.	1.	0.	0.	0.	0.
2300	0.	0.	0.	7.	115.	1.	0.	1.	1.	0.	0.	0.	0.	0.	0.
TOTALS	7899.	42157.	508.	6431.	26846.	1339.	409.	1231.	671.	44.	80.	1.	119.	1863.	10.
AVERAGE PER VEHICLE	16.	83.	0.	5.	20.	0.	1.	2.	0.	44.	80.	0.	12.	186.	0.

d. Computer Program C - "As Received" quantities of refuse by type of vehicle and by political subdivision. This program is the same as Program B except that the political subdivision is substituted for hours of the day. The political (governmental) subdivision is found in Columns 61, 62 and 63 of the survey form. The run containing all facilities is shown in Table II-11.

e. Computer Program D - "As Received" quantities of refuse by type of vehicle and by geographic area. This program is the same as the previous Program C except that the geographic area is substituted for the Political Subdivision. The geographic area was calculated by the computer from coordinates inserted into the computer program.

The run containing the total for all facilities is shown in Table II-12.

f. Computer Program E - "As Received" quantities of refuse by type of hauler and by hours of the day. This program determines the cubic yards, pounds and number of vehicles for each individual hauler that comes into a site by the hours of the day. The run containing the total for all sites is shown in Table II-13.

g. Computer Program F - "As Received" quantities of refuse by type of hauler and by type of vehicle. This program is the same as Program E except that type of vehicle is substituted for hours of the day. In this program the "As Received" quantities are sorted by type of hauler and by type of vehicle. The totals are the same as Program E. The run containing the total for all sites is shown in Table II-14.

h. Computer Program G - "As Received" quantities by type of hauler and by political subdivision. This program is the same as Program F except that political subdivision is substituted for the type of vehicle. This program determines the "As Received" quantities by type of hauler and by political (governmental) subdivision found in Columns 61, 62 and 63 of the survey form.

The totals are the same as the programs E and F. The run containing the total for all facilities is shown in Table II-15.

i. Computer Program H - "As Received" quantities of refuse by type of hauler and by geographic area. This program is the same as Program G except that the geographic area is substituted for political subdivisions. This program determines the "As Received" quantities by the type of hauler and by geographic area found in Columns 64, 65 and 66. The run containing the total for all facilities is shown in Table II-16.

TABLE II-11 COMPUTER PROGRAM C.

TOTAL FOR ALL FACILITIES

AS RECEIVED QUANTITIES OF REFUSE BY TYPE OF VEHICLE, AND BY POLITICAL SUBDIVISION, FOR ALL DAYS

TOTALS AS RECEIVED

CODE	POLITICAL SUBDIVISION DESCRIPTION	PACKER			DUMP			VAN			LIGHT TRAILER			HEAVY TRAILER		
		CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
1	OMAHA	9291.	58551.	570.	3601.	43506.	451.	3229.	7441.	222.	82.	282.	24.	922.	2754.	40.
2	RALSTON	126.	690.	8.	0.	0.	0.	10.	24.	2.	0.	0.	0.	0.	0.	0.
3	IRVINGTON	0.	0.	0.	5.	15.	1.	0.	0.	0.	5.	14.	1.	0.	0.	0.
4	BENNINGTON	20.	123.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	WATERLOO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	ELKHORN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	MILLARD	186.	1140.	12.	0.	0.	0.	5.	11.	2.	0.	0.	0.	0.	0.	0.
12	COUNCIL BLUFFS	1570.	8826.	94.	1569.	21883.	170.	571.	2295.	47.	243.	994.	75.	347.	531.	4.
13	CARTER LAKE	52.	320.	3.	12.	22.	1.	4.	10.	1.	4.	13.	1.	30.	74.	1.
15	CRESENT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	LAKE MANAWA	32.	206.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
19	MINDEN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27	MACEDONIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33	BELVIEW	17.	56.	1.	19.	230.	2.	0.	0.	0.	8.	96.	2.	0.	0.	0.
34	SAC	124.	755.	12.	0.	0.	0.	26.	80.	3.	0.	0.	0.	0.	0.	0.
35	PAPILLION	0.	0.	0.	0.	0.	0.	14.	46.	2.	1.	1.	1.	0.	0.	0.
37	LAVISTA	32.	173.	2.	7.	13.	1.	2.	7.	1.	1.	10.	1.	0.	0.	0.
41	GRETNA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0	0.	0.
44		0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0	0.	0.
50	DOUGLAS COUNTY	1167.	7444.	71.	344.	6025.	46.	157.	495.	12.	13.	52.	5.	91.	168.	3.
51	SARPY COUNTY	34.	190.	3.	0.	0.	0.	68.	191.	6.	0.	0.	0.	0.	0.	0.
52	POTTAWATTAMIE COUNTY	16.	99.	1.	0.	0.	0.	1.	1.	1.	6.	14.	1.	0.	0.	0.
	TOTALS	12602.	78572.	781.	5558.	71693.	672.	4089.	10601.	255.	362.	1476.	111.	1390.	3526.	48.
	AVERAGE PER VEHICLE	16.	101.	0.	8.	107.	0.	14.	35.	0.	3.	13.	0.	29.	73.	0.

CODE	FLAT BED			PICK UP			AUTO			TRANSFER VEHICLE			OTHER		
	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
1	5521.	26555.	344.	2841.	11822.	553.	53.	240.	166	0.	0.	0.	0.	0.	0.
2	18.	41.	1.	34.	105.	6.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	35.	375.	2.	11.	32.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	0.	0.	0.	11.	24.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	5.	11.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	0.	0.	0.	0.	0.	0.	1.	2.	1.	0.	0.	0.	0.	0.	0.
11	105.	396.	6.	40.	434.	5.	2.	5.	3.	0.	0	0.	0.	0.	0.
12	641.	3847.	51.	2950.	11321.	641.	253.	742.	393.	0.	0.	0.	21.	270.	0.
13	167.	433.	8.	11.	21.	2.	0.	0.	1.	0.	0.	0.	0.	0.	0.
15	0.	0.	0.	3.	84.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	0.	0.	0.	13.	21.	3.	0.	0.	0.	0.	0.	0.	0.	0.	0.
19	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
27	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
33	38.	70.	1.	67.	264.	15.	1.	4.	3.	0.	0.	0.	0.	0.	0.
34	255.	2139.	16.	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.
35	118.	1139.	12.	24.	160.	7.	6.	17.	16.	0.	0.	0.	0.	0.	0.
37	0.	0.	0.	16.	72.	3.	1.	2.	1.	0.	0.	0.	0.	0.	0.
41	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
44	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
50	703.	6094.	49.	258.	1604.	61.	42.	193.	69.	44.	80.	1.	98.	1593.	8.
51	239.	952.	14.	116.	760.	25.	3.	7.	9.	0.	0.	0.	0.	0.	0.
52	19.	10.	1.	35.	112.	9.	5.	16.	8.	0.	0.	0.	0.	0.	0.
	7899.	42157.	508.	6431.	26846.	1339.	409.	1231.	671.	44.	80.	1.	119.	1863.	10.
	16.	83.	0.	5.	20.	0.	1.	2.	0.	44.	80.	0.	12.	186.	0.

TABLE II-12 COMPUTER PROGRAM D.

TOTAL FOR ALL FACILITIES

AS RECEIVED QUANTITIES OF REFUSE BY TYPE OF VEHICLE, AND BY GEOGRAPHIC AREA, FOR ALL DAYS

GEOGRAPHIC AREA	PACKER CU YDS	PACKER POUNDS	PACKER # VEHICLES	DUMP CU YDS	DUMP POUNDS	DUMP # VEHICLES	VAN CU YDS	VAN POUNDS	VAN # VEHICLES	LIGHT TRAILER CU YDS	LIGHT TRAILER POUNDS	LIGHT TRAILER # VEHICLES	HEAVY TRAILER CU YDS	HEAVY TRAILER POUNDS	HEAVY TRAILER # VEHICLES
2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	20.	123.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	388.	2322.	24.	27.	234.	4.	1.	2.	2.	8.	17.	1.	89.	164.	1.
9	32.	173.	2.	0.	0.	0.	5.	10.	1.	2.	4.	1.	0.	0.	0.
10	0.	0.	0.	5.	15.	1.	0.	0.	0.	5.	14.	1.	0.	0.	0.
12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	310.	1821.	21.	33.	382.	5.	57.	160.	4.	3.	8.	1.	0.	0.	0.
16	1237.	7351.	78.	186.	3474.	29.	70.	123.	9.	15.	42.	3.	18.	44.	2.
17	1096.	6401.	68.	1330.	18240.	149.	773.	1671.	33.	10.	26.	3.	246.	1407.	9.
18	120.	688.	8.	245.	569.	32.	4.	10.	1.	4.	13.	1.	24.	57.	2.
19	2620.	14211.	162.	1232.	13950.	149.	1648.	3373.	117.	25.	135.	6.	454.	900.	19.
20	1353.	12716.	79.	105.	924.	14.	352.	1252.	23.	6.	10.	3.	36.	65.	2.
21	614.	3493.	39.	115.	1471.	17.	110.	231.	13.	5.	13.	3.	22.	50.	3.
22	158.	928.	11.	204.	4247.	24.	15.	137.	4.	15.	57.	4.	0.	0.	0.
24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	632.	4502.	40.	100.	1268.	15.	59.	153.	5.	0.	0.	0.	0.	0.	0.
26	466.	2826.	28.	31.	549.	4.	125.	365.	9.	3.	7.	3.	85.	155.	2.
27	678.	3706.	40.	0.	0.	0.	87.	256.	5.	4.	14.	1.	12.	30.	1.
28	1075.	7105.	65.	346.	4283.	55.	85.	218.	13.	0.	0.	0.	57.	123.	3.
29	12.	56.	1.	14.	227.	1.	0.	0.	0.	6.	89.	1.	0.	0.	0.
30	13.	60.	1.	0.	0.	0.	45.	147.	4.	0.	0.	0.	0.	0.	0.
31	27.	142.	2.	0.	0.	0.	2.	7.	1.	1.	10.	1.	0.	0.	0.
32	0.	0.	0.	7.	13.	1.	14.	46.	2.	1.	1.	1.	0.	0.	0.
36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
38	10.	62.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
39	124.	755.	12.	5.	3.	1.	26.	80.	3.	0.	0.	0.	0.	0.	0.
40	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	7.	1.	0.	0.	0.
41	0.	0.	0.	0.	0.	0.	8.	15.	1.	0.	0.	0.	0.	0.	0.
118	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
136	0.	0.	0.	0.	0.	0.	0.	0.	0.	6.	14.	1.	0.	0.	0.
137	32.	200.	2.	57.	891.	6.	27.	82.	2.	10.	70.	4.	0.	0.	0.
138	384.	2357.	24.	728.	8844.	74.	215.	1120.	22.	123.	558.	36.	0.	0.	0.
139	1154.	6269.	68.	759.	11896.	89.	329.	1193.	23.	109.	366.	35.	347.	531.	4.
140	0.	0.	0.	0.	0.	0.	1.	1.	1.	0.	0.	0.	0.	0.	0.
142	32.	206.	2.	27.	275.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.
143	16.	99.	1.	0.	0.	0.	25.	46.	1.	0.	0.	0.	0.	0.	0.
TOTALS	12602.	78573.	781.	5558.	71694.	672.	4089.	16601.	299.	362.	1476.	111.	1390.	3526.	48.
AVERAGE PER VEHICLE	16.	101.	0.	8.	107.	0.	14.	35.	0.	3.	13.	0.	29.	73.	0.

TABLE II-12 COMPUTER PROGRAM D.
PAGE 2

GEOGRAPHIC AREA	FLAT BED			PICK UP			AUTO			TRANSFER VEHICLE			OTHER		
	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
2	0.	0.	0.	5.	10.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	0.	0.	0.	11.	24.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6	0.	0.	0.	7.	16.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	25.	405.	1.	5.	10.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	244.	866.	15.	88.	350.	15.	2.	6.	3.	0.	0.	0.	0.	0.	0.
9	12.	33.	1.	10.	22.	2.	5.	49.	8.	0.	0.	0.	0.	0.	0.
10	35.	379.	2.	11.	32.	1.	1.	1.	2.	0.	0.	0.	0.	0.	0.
12	5.	11.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	0.	0.	0.	5.	25.	3.	1.	2.	1.	0.	0.	0.	0.	0.	0.
14	14.	230.	1.	2.	5.	2.	2.	5.	3.	0.	0.	0.	0.	0.	0.
15	82.	982.	8.	165.	606.	29.	19.	51.	40.	0.	0.	0.	0.	0.	0.
16	397.	1930.	29.	352.	1473.	72.	24.	63.	42.	0.	0.	0.	0.	0.	0.
17	1003.	3690.	60.	664.	2564.	125.	4.	11.	11.	0.	0.	0.	0.	0.	0.
18	175.	453.	9.	43.	154.	6.	1.	1.	3.	0.	0.	0.	0.	0.	0.
19	2399.	11889.	138.	634.	2375.	120.	9.	21.	20.	0.	0.	0.	0.	0.	0.
20	539.	3091.	38.	355.	1859.	68.	11.	31.	16.	0.	0.	0.	0.	0.	0.
21	442.	2327.	35.	177.	476.	32.	21.	54.	32.	0.	0.	0.	0.	0.	0.
22	174.	1917.	13.	63.	720.	14.	16.	88.	23.	0.	0.	0.	0.	0.	0.
24	0.	0.	0.	8.	29.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	172.	914.	12.	100.	985.	24.	8.	23.	12.	0.	0.	0.	98.	1592.	8.
26	124.	1250.	7.	68.	351.	15.	7.	18.	11.	44.	80.	1.	0.	0.	0.
27	164.	713.	11.	120.	435.	24.	5.	12.	7.	0.	0.	0.	0.	0.	0.
28	626.	3099.	34.	377.	1523.	75.	2.	5.	7.	0.	0.	0.	0.	0.	0.
29	0.	0.	0.	36.	96.	6.	1.	2.	1.	0.	0.	0.	0.	0.	0.
30	241.	882.	12.	75.	494.	15.	2.	5.	6.	0.	0.	0.	0.	0.	0.
31	15.	88.	2.	41.	268.	8.	2.	4.	5.	0.	0.	0.	0.	0.	0.
32	55.	220.	5.	23.	186.	7.	4.	11.	12.	0.	0.	0.	0.	0.	0.
36	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	63.	917.	7.	4.	9.	1.	1.	4.	2.	0.	0.	0.	0.	0.	0.
38	0.	0.	0.	6.	17.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.
39	244.	1947.	15.	0.	1.	1.	0.	1.	1.	0.	0.	0.	0.	0.	0.
40	12.	191.	1.	32.	169.	9.	1.	3.	2.	0.	0.	0.	0.	0.	0.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
118	0.	0.	0.	3.	84.	1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
136	0.	0.	0.	3.	10.	1.	0.	1.	1.	0.	0.	0.	0.	0.	0.
137	99.	431.	7.	177.	653.	45.	67.	144.	102.	0.	0.	0.	0.	0.	0.
138	279.	1829.	24.	1341.	5059.	304.	90.	320.	145.	0.	0.	0.	21.	270.	2.
139	209.	1214.	17.	1413.	5515.	288.	97.	282.	146.	0.	0.	0.	0.	0.	0.
140	0.	0.	0.	0.	0.	0.	2.	9.	4.	0.	0.	0.	0.	0.	0.
142	50.	259.	3.	42.	172.	9.	1.	1.	1.	0.	0.	0.	0.	0.	0.
143	0.	0.	0.	25.	68.	7.	1.	1.	1.	0.	0.	0.	0.	0.	0.
TOTALS	7899.	42157.	508.	6429.	26847.	1339.	409.	1231.	671.	44.	80.	1.	119.	1863.	10.
AVERAGE PER VEHICLE	16.	83.	0.	5.	20.	0.	1.	2.	0.	44.	80.	0.	12.	186.	0.

TABLE II-13 COMPUTER PROGRAM E.

TOTAL FOR ALL FACILITIES

AS RECEIVED QUANTITIES OF REFUSE BY TYPE OF HAULER, AND BY HOURS OF THE DAY, FOR ALL DAYS

TOTALS AS RECEIVED

HOUR	GENERAL CONTRACTOR			WRECKING CONTRACTOR			ELM TREE REMOVAL			COML HAULER - DOMESTIC			COML HAULER - COMMERCIAL			COML HAULER - INDUSTRIAL		
	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	38.	82.	4.	0.	0.	0.
200	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	62.	165.	8.	0.	0.	0.
300	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	116.	329.	12.	0.	0.	0.
400	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	117.	917.	13.	0.	0.	0.
500	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	81.	365.	11.	0.	0.	0.
600	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	107.	600.	10.	0.	0.	0.
700	20.	123.	1.	0.	0.	0.	0.	0.	0.	188.	685.	9.	364.	1459.	28.	0.	0.	0.
800	208.	3306.	20.	35.	553.	6.	152.	727.	10.	265.	1158.	20.	488.	2461.	43.	0.	0.	0.
900	178.	2824.	21.	53.	718.	6.	88.	308.	6.	332.	1551.	35.	735.	3313.	62.	108.	472.	3.
1000	271.	4344.	29.	42.	505.	4.	228.	1082.	13.	746.	4016.	64.	734.	3217.	59.	10.	324.	1.
1100	277.	5209.	29.	53.	794.	11.	114.	575.	11.	1202.	6584.	104.	638.	2457.	55.	22.	614.	2.
1200	180.	2652.	22.	45.	845.	6.	194.	693.	14.	1800.	9691.	133.	645.	2366.	54.	38.	196.	3.
1300	203.	3093.	22.	69.	1105.	7.	258.	1016.	19.	1318.	7248.	107.	697.	3200.	51.	38.	165.	4.
1400	264.	3079.	24.	49.	1004.	7.	332.	1353.	21.	1264.	6224.	108.	701.	3123.	60.	0.	0.	0.
1500	253.	2957.	26.	16.	208.	4.	441.	1645.	32.	1274.	6464.	115.	697.	2905.	54.	33.	56.	2.
1600	195.	2809.	26.	44.	683.	8.	230.	812.	14.	529.	4783.	92.	646.	2384.	49.	12.	191.	1.
1700	89.	1122.	8.	5.	76.	1.	102.	454.	7.	477.	2137.	48.	433.	1871.	26.	34.	780.	3.
1800	23.	559.	2.	0.	0.	0.	0.	0.	0.	118.	616.	11.	129.	1031.	10.	0.	0.	0.
1900	0.	0.	0.	0.	0.	0.	0.	0.	0.	32.	197.	2.	38.	247.	4.	0.	0.	0.
2000	0.	0.	0.	0.	0.	0.	10.	77.	1.	0.	0.	0.	22.	89.	2.	0.	0.	0.
2100	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	25.	96.	2.	0.	0.	0.
2200	1.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.	29.	109.	1.	0.	0.	0.
2300	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16.	99.	1.	0.	0.	0.
TOTALS	2158.	32117.	232.	410.	6491.	60.	2149.	8744.	148.	9948.	51336.	847.	7562.	32940.	621.	293.	2798.	19.
AVERAGE PER VEHICLE	9.	138.	0.	7.	108.	0.	15.	59.	0.	12.	61.	0.	12.	52.	0.	15.	147.	0.

TIME	COMMERCIAL			INDUSTRIAL			PUBLIC - DOMESTIC			PUBLIC - COMMERCIAL			PUBLIC - INDUSTRIAL			OTHER PUBLIC VEHICLE			PRIVATE CITIZEN - DOMESTIC		
	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
100	8.	19.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
200	4.	9.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
300	8.	20.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
400	4.	7.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
500	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
600	19.	252.	4.	5.	81.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
700	185.	889.	8.	4.	65.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	55.	182.	5.
800	523.	1060.	31.	401.	1670.	20.	80.	474.	5.	18.	430.	2.	0.	0.	0.	240.	3624.	32.	104.	305.	29.
900	565.	2551.	46.	186.	1117.	19.	104.	671.	8.	80.	345.	5.	0.	0.	0.	252.	4062.	31.	301.	1196.	99.
1000	727.	3279.	64.	435.	2284.	30.	190.	1374.	13.	0.	0.	0.	1.	1.	1.	345.	6203.	40.	428.	1786.	142.
1100	793.	3268.	61.	418.	1635.	25.	104.	629.	8.	13.	186.	2.	11.	20.	1.	329.	7117.	40.	742.	3101.	218.
1200	367.	1339.	34.	136.	903.	11.	142.	1091.	10.	39.	319.	3.	0.	0.	0.	177.	2237.	19.	462.	2052.	149.
1300	521.	2856.	36.	272.	1009.	12.	144.	880.	9.	37.	437.	4.	0.	0.	0.	260.	4196.	33.	474.	1946.	188.
1400	729.	2947.	47.	202.	986.	15.	167.	1003.	13.	0.	0.	0.	0.	0.	0.	383.	5095.	47.	447.	1601.	165.
1500	646.	3910.	48.	288.	1679.	16.	41.	417.	3.	47.	619.	6.	9.	24.	1.	335.	4753.	46.	556.	1850.	213.
1600	403.	2106.	30.	98.	384.	5.	0.	0.	0.	9.	19.	1.	0.	0.	0.	118.	2584.	13.	467.	1872.	170.
1700	153.	1530.	14.	3.	6.	1.	4.	7.	1.	0.	0.	0.	0.	0.	0.	9.	165.	2.	351.	1232.	115.
1800	43.	145.	5.	18.	32.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	73.	185.	20.
1900	21.	48.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	11.	3.
2000	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	10.	24.	4.
2100	10.	19.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.
2200	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
2300	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.	116.	2.
	5749.	26301.	436.	2467.	11830.	153.	987.	6546.	70.	243.	2355.	23.	20.	45.	3.	2449.	39975.	303.	4485.	17021.	1526.
	13.	60.	0.	16.	77.	0.	14.	94.	0.	11.	102.	0.	7.	15.	0.	8.	132.	0.	3.	11.	0.

TABLE II-14 COMPUTER PROGRAM F.

TOTAL FOR ALL FACILITIES

AS RECEIVED QUANTITIES OF REFUSE BY TYPE OF HAULER AND BY TYPE OF VEHICLE, FOR ALL DAYS

TOTALS AS RECEIVED

CODE	VEHICLE TYPE DESCRIPTION	GENERAL CONTRACTOR			WRECKING CONTRACTOR			ELM TREE REMOVAL			COML HAULER - DOMESTIC			COML HAULER - COMMERCIAL			COML HAULER - INDUSTRIAL		
		CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
1	PACKER	30.	234.	2.	25.	161.	2.	25.	135.	1.	6558.	40033.	405.	3494.	20019.	226.	44.	917.	3.
2	DUMP	794.	15276.	85.	148.	2646.	23.	301.	1446.	28.	58.	260.	10.	1124.	3613.	139.	41.	702.	4.
3	VAN	29.	468.	6.	0.	0.	0.	252.	780.	14.	270.	1008.	20.	754.	1752.	74.	58.	106.	2.
4	LIGHT TRAILER	6.	89.	1.	0.	0.	0.	3.	16.	1.	3.	7.	2.	4.	7.	2.	0.	0.	0.
5	HEAVY TRAILER OR SEMI	18.	287.	1.	0.	0.	0.	0.	0.	0.	11.	25.	1.	427.	896.	23.	89.	164.	1.
6	FLAT BED OR STAKE	1010.	12239.	80.	157.	2792.	20.	1464.	6002.	85.	1342.	4833.	81.	1280.	4763.	77.	30.	584.	4.
7	PICKUP	263.	3524.	57.	79.	871.	15.	104.	362.	18.	1625.	5168.	327.	470.	1460.	79.	12.	17.	3.
8	AUTO OR STATION WAGON	0.	0.	0.	0.	0.	0.	0.	1.	1.	2.	2.	1.	0.	0.	0.	0.	0.	0.
9	TRANSFER VEHICLE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	OTHER	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	19.	308.	2.
	TOTALS	2150.	32117.	232.	410.	6491.	60.	2149.	8744.	148.	9868.	51336.	847.	7552.	32509.	620.	293.	2798.	19.
	AVERAGE PER VEHICLE	9.	138.	0.	7.	108.	0.	15.	59.	0.	12.	61.	0.	12.	52.	0.	15.	147.	0.

CODE	COMMERCIAL			INDUSTRIAL			PUBLIC - DOMESTIC			PUBLIC - COMMERCIAL			PUBLIC - INDUSTRIAL			OTHER PUBLIC VEHICLE			PRIVATE CITIZEN - DOMESTIC		
	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
1	704.	7557.	41.	619.	3096.	35.	911.	5679.	57.	144.	680.	9.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	393.	3720.	55.	434.	3011.	47.	19.	393.	3.	67.	1599.	9.	0.	0.	0.	2080.	38785.	262.	57.	243.	7.
3	1966.	3966.	109.	550.	1772.	24.	0.	0.	0.	0.	0.	0.	0.	0.	0.	55.	93.	3.	175.	637.	47.
4	17.	76.	4.	7.	100.	1.	0.	0.	0.	8.	17.	1.	0.	0.	0.	0.	0.	0.	315.	1162.	99.
5	434.	539.	11.	383.	1144.	7.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	29.	70.	4.
6	1543.	6724.	90.	317.	1634.	20.	29.	362.	2.	16.	41.	2.	9.	24.	1.	261.	686.	14.	441.	1474.	32.
7	636.	2188.	117.	76.	479.	16.	27.	111.	8.	8.	16.	2.	11.	20.	1.	53.	411.	24.	3066.	12216.	672.
8	2.	7.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.	0.	0.	0.	403.	1220.	665.
9	44.	60.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10	59.	961.	5.	41.	594.	3.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	5739.	26278.	435.	2467.	11830.	153.	987.	6546.	70.	243.	2355.	23.	20.	45.	3.	2449.	39975.	303.	4486.	17021.	1526.
	13.	60.	0.	16.	77.	0.	14.	94.	0.	11.	102.	0.	7.	15.	0.	8.	132.	0.	3.	11.	0.

TABLE II-15 COMPUTER PROGRAM G.

TOTAL FOR ALL FACILITIES

AS RECEIVED QUANTITIES OF REFUSE BY TYPE OF HAULER AND BY POLITICAL SUBDIVISION, FOR ALL DAYS

TOTALS AS RECEIVED

CODE	POLITICAL SUBDIVISION DESCRIPTION	GENERAL CONTRACTOR CU YDS	POUNDS	# VEHICLES	WRECKING CONTRACTOR CU YDS	POUNDS	# VEHICLES	ELM TREE REMOVAL CU YDS	POUNDS	# VEHICLES	COML HAULER - DOMESTIC CU YDS	POUNDS	# VEHICLES	COML HAULER - COMMERCIAL CU YDS	POUNDS	# VEHICLES	COML HAULER - INDUSTRIAL CU YDS	POUNDS	# VEHICLES
1	OMAHA	910.	10269.	99.	275.	4006.	40.	1379.	5285.	84.	7284.	40198.	477.	5970.	25185.	473.	113.	966.	7.
2	RALSTON	0.	0.	0.	0.	0.	0.	0.	0.	0.	100.	522.	6.	44.	209.	3.	0.	0.	0.
3	IRVINGTON	21.	335.	1.	0.	0.	0.	0.	0.	0.	14.	44.	1.	0.	0.	0.	0.	0.	0.
4	BENNINGTON	0.	0.	0.	0.	0.	0.	0.	0.	0.	20.	123.	2.	5.	11.	1.	0.	0.	0.
8	WATERLOO	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	11.	1.	0.	0.	0.
9	ELKHORN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	MILLARD	59.	518.	6.	5.	84.	2.	0.	0.	0.	43.	183.	2.	124.	692.	9.	0.	0.	0.
12	COUNCIL BLUFFS	596.	12022.	65.	18.	106.	1.	469.	1974.	43.	1412.	5218.	281.	440.	1777.	65.	111.	382.	5.
13	CARTER LAK	0.	0.	0.	0.	0.	0.	12.	32.	1.	131.	525.	7.	63.	129.	3.	0.	0.	0.
15	CRESENT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
18	LAKE MANAWA	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	3.	1.	0.	[illegible]	0.	0.	0.	0.
33	BELVIEW	27.	414.	4.	0.	0.	0.	0.	0.	0.	5.	14.	1.	50.	12[illegible]	2.	0.	0.	0.
34	SAC	75.	867.	4.	0.	0.	0.	182.	1015.	12.	119.	733.	11.	9.	33.	2.	12.	191.	1.
35	PAPILLION	70.	1032.	8.	5.	76.	1.	12.	38.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	LAVISTA	2.	36.	1.	0.	0.	0.	0.	0.	0.	34.	180.	3.	9.	27.	1.	7.	13.	1.
41	GRETNA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
50	DOUGLAS COUNTY	363.	6330.	40.	107.	2218.	16.	12.	33.	1.	501.	2581.	31.	807.	4251.	57.	51.	1246.	5.
51	SARPY COUNTY	34.	293.	4.	0.	0.	0.	83.	367.	6.	249.	874.	19.	0.	0.	0.	0.	0.	0.
52	POTTAWATTAMIE COUNTY	0.	0.	0.	0.	0.	0.	0.	0.	0.	33.	138.	5.	27.	58.	3.	0.	0.	0.
	TOTALS	2158.	32117.	232.	410.	6491.	60.	2149.	8744.	148.	9948.	51336.	847.	7552.	32509.	620.	293.	2798.	19.
	AVERAGE PER VEHICLE	9.	138.	0.	7.	108.	0.												

CODE	COMMERCIAL CU YDS	POUNDS	# VEHICLES	INDUSTRIAL CU YDS	POUNDS	# VEHICLES	PUBLIC - DOMESTIC CU YDS	POUNDS	# VEHICLES	PUBLIC - COMMERCIAL CU YDS	POUNDS	# VEHICLES	PUBLIC - INDUSTRIAL CU YDS	POUNDS	# VEHICLES	OTHER PUBLIC VEHICLE CU YDS	POUNDS	# VEHICLES	PRIVATE CITIZEN - DOMESTIC CU YDS	POUNDS	# VEHICLES
1	4258.	18220.	309.	932.	3587.	49.	73.	677.	10.	99.	1675.	14.	19.	44.	2.	1953.	32600.	229.	2314.	8440.	577.
2	27.	90.	4.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	17.	40.	4.
3	5.	15.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	15.	46.	2.
4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	6.	13.	1.
8	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.	1.
11	67.	406.	6.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	25.	67.	1.	17.	37.	6.
12	598.	3009.	59.	1505.	7900.	101.	862.	5564.	56.	128.	579.	8.	1.	1.	1.	403.	5812.	62.	1622.	6385.	730.
13	38.	90.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	37.	118.	5.
15	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	84.	1.
18	0.	0.	0.	0.	0.	0.	16.	106.	1.	16.	100.	1.	0.	0.	0.	0.	0.	0.	12.	28.	2.
33	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	3.	1.	59.	163.	16.
34	8.	134.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
35	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	77.	215.	28.
37	1.	10.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	11.	2.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
50	681.	4064.	47.	25.	333.	2.	31.	193.	2.	0.	0.	0.	0.	0.	0.	62.	1490.	8.	217.	1008.	116.
51	22.	171.	3.	0.	0.	0.	4.	7.	1.	0.	0.	0.	0.	0.	0.	0.	2.	1.	66.	385.	23.
52	0.	0.	0.	5.	9.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16.	47.	12.
	5739.	26278.	435.	2467.	11830.	153.	987.	6546.	70.	243.	2355.	23.	20.	45.	3.	2449.	39975.	303.	4485.	17021.	1526.
	13.	60.	0.	16.	77.	0.	14.	94.	0.	11.	102.	0.	7.	15.	0.	8.	132.	0.	3.	11.	0.

TABLE II-18 COMPUTER PROGRAM H.

TOTAL FOR ALL FACILITIES

AS RECEIVED QUANTITIES OF REFUSE BY TYPE OF HAULER, AND BY GEOGRAPHIC AREA, FOR ALL DAYS

GEOGRAPHIC AREA	GENERAL CONTRACTOR			WRECKING CONTRACTOR			ELM TREE REMOVAL			COML HAULER - DOMESTIC			COML HAULER - COMMERCIAL			COML HAULER - INDUSTRIAL		
	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.	0.	0.	0.	0.	20.	123.	2.	5.	11.	1.	0.	0.	0.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7	25.	405.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8	0.	0.	0.	0.	0.	0.	37.	61.	3.	432.	2521.	28.	32.	92.	2.	0.	0.	0.
9	0.	0.	0.	0.	0.	0.	12.	33.	1.	16.	99.	1.	0.	0.	0.	0.	0.	0.
10	21.	335.	1.	0.	0.	0.	0.	0.	0.	14.	44.	1.	0.	0.	0.	0.	0.	0.
12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	11.	1.	0.	0.	0.
13	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.	11.	1.	0.	0.	0.
14	14.	230.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
15	53.	823.	7.	25.	377.	3.	0.	0.	0.	326.	1727.	22.	63.	304.	5.	0.	0.	0.
16	88.	1011.	11.	7.	113.	2.	124.	567.	10.	1152.	6590.	77.	253.	1101.	18.	7.	288.	1.
17	118.	1507.	13.	23.	336.	3.	312.	1275.	18.	1098.	5956.	77.	385.	1915.	37.	38.	70.	3.
18	0.	0.	0.	0.	0.	0.	21.	56.	2.	149.	636.	8.	345.	930.	36.	0.	0.	0.
19	352.	4178.	35.	49.	425.	8.	486.	1724.	27.	1567.	8446.	98.	3449.	12226.	263.	67.	609.	3.
20	128.	1844.	15.	30.	684.	5.	178.	707.	14.	851.	4604.	57.	572.	3649.	39.	0.	0.	0.
21	113.	1514.	13.	63.	1148.	9.	0.	0.	0.	456.	2629.	34.	381.	1304.	30.	6.	96.	1.
22	153.	3031.	20.	62.	1104.	10.	0.	0.	0.	196.	1640.	12.	85.	760.	7.	0.	0.	0.
24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
25	140.	1670.	16.	43.	715.	9.	0.	0.	0.	86.	307.	4.	422.	2552.	30.	45.	1150.	4.
26	16.	125.	2.	42.	858.	4.	0.	0.	0.	257.	1475.	16.	211.	1281.	15.	0.	0.	0.
27	40.	98.	3.	15.	90.	1.	73.	298.	3.	476.	2808.	31.	249.	1146.	15.	0.	0.	0.
28	91.	683.	8.	28.	458.	4.	171.	716.	9.	974.	5467.	61.	559.	3194.	47.	0.	0.	0.
29	20.	316.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	12.	56.	1.	0.	0.	0.
30	30.	236.	2.	0.	0.	0.	73.	339.	5.	205.	638.	15.	38.	70.	1.	0.	0.	0.
31	4.	57.	1.	0.	0.	0.	0.	0.	0.	33.	203.	4.	9.	27.	1.	0.	0.	0.
32	9.	151.	2.	5.	76.	1.	12.	38.	1.	0.	0.	0.	0.	0.	0.	7.	13.	1.
36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
37	63.	917.	7.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
38	0.	0.	0.	0.	0.	0.	0.	0.	0.	16.	62.	1.	0.	0.	0.	0.	0.	0.
39	75.	868.	5.	0.	0.	0.	102.	1015.	12.	119.	733.	11.	9.	33.	2.	0.	0.	0.
40	7.	98.	2.	0.	0.	0.	0.	0.	0.	5.	14.	1.	0.	0.	0.	12.	191.	1.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
118	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
136	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
137	45.	843.	4.	0.	0.	0.	54.	254.	8.	48.	142.	12.	20.	131.	4.	0.	0.	0.
138	158.	3227.	13.	0.	0.	0.	228.	864.	20.	665.	2331.	124.	134.	753.	22.	13.	80.	2.
139	394.	7951.	48.	18.	106.	1.	170.	858.	19.	721.	2525.	141.	285.	893.	39.	98.	302.	3.
140	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
142	0.	0.	0.	0.	0.	0.	18.	57.	1.	18.	80.	4.	23.	51.	2.	0.	0.	0.
143	0.	0.	0.	0.	0.	0.	0.	0.	0.	33.	138.	5.	4.	7.	1.	0.	0.	0.
TOTALS	2158.	32117.	232.	410.	6491.	60.	2149.	8744.	148.	9948.	51336.	847.	7552.	32510.	620.	293.	2798.	19.
AVERAGE PER VEHICLE	9.	138.	0.	7.	108.	0.	15.	59.	0.	12.	61.	0.	12.	92.	0.	15.	147.	0.

TABLE II-16 COMPUTER PROGRAM H.

GEOGRAPHIC AREA	COMMERCIAL			INDUSTRIAL			PUBLIC - DOMESTIC			PUBLIC - COMMERCIAL			PUBLIC - INDUSTRIAL			OTHER PUBLIC VEHICLE			PRIVATE CITIZEN - DOMESTIC		
	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES	CU YDS	POUNDS	# VEHICLES
2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	10.	1.
3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	6.	13.	1.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	7.	16.	1.
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	10.	1.
8	115.	419.	7.	133.	595.	5.	0.	0.	0.	17.	36.	2.	0.	0.	0.	0.	0.	0.	60.	238.	18.
9	20.	76.	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18.	83.	11.
10	5.	15.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16.	47.	4.
12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
13	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.	1.	1.	14.	2.
14	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.	1.	3.	8.	4.
15	37.	121.	6.	0.	0.	0.	10.	62.	1.	0.	0.	0.	0.	0.	0.	19.	307.	3.	75.	290.	61.
16	194.	1294.	22.	0.	0.	0.	23.	271.	2.	56.	1382.	8.	0.	0.	0.	71.	866.	12.	322.	1076.	101.
17	872.	2547.	62.	499.	1705.	24.	12.	23.	3.	0.	0.	0.	8.	25.	1.	1066.	16343.	107.	693.	2308.	110.
18	32.	72.	5.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	70.	252.	11.
19	1950.	5868.	132.	164.	721.	9.	0.	0.	0.	9.	216.	1.	11.	20.	1.	461.	10655.	55.	457.	1766.	99.
20	575.	6595.	33.	61.	304.	4.	9.	16.	1.	15.	40.	3.	0.	0.	0.	61.	485.	7.	238.	939.	65.
21	314.	849.	29.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14.	328.	2.	119.	248.	56.
22	34.	469.	4.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	48.	1182.	4.	65.	509.	36.
24	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	8.	29.	2.
25	288.	2124.	23.	34.	350.	2.	21.	131.	1.	0.	0.	0.	0.	0.	0.	25.	67.	1.	64.	311.	26.
26	347.	1460.	16.	5.	9.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	76.	394.	26.
27	117.	325.	8.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	99.	400.	28.
28	182.	860.	19.	60.	155.	6.	29.	366.	4.	0.	0.	0.	0.	0.	0.	271.	3897.	44.	202.	758.	50.
29	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	36.	97.	7.
30	14.	156.	2.	0.	0.	0.	4.	7.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	18.	142.	12.
31	1.	10.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	41.	222.	12.
32	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	72.	200.	23.
36	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
37	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	13.	3.
38	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.	1.	5.	14.	1.
39	0.	134.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	3.	1.	0.	0.	0.
40	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	23.	66.	9.
41	0.	15.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
118	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	4.	86.	2.
136	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	10.	25.	3.
137	21.	47.	3.	0.	0.	0.	34.	206.	3.	0.	0.	0.	0.	0.	0.	61.	219.	5.	185.	629.	134.
138	212.	1212.	26.	413.	2612.	36.	368.	2271.	23.	16.	86.	1.	1.	1.	1.	205.	3553.	38.	829.	3425.	325.
139	333.	1500.	28.	1092.	5287.	65.	451.	2869.	29.	112.	493.	7.	0.	0.	0.	136.	2046.	19.	608.	2335.	271.
140	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	10.	5.
142	34.	263.	3.	5.	9.	1.	25.	325.	2.	16.	100.	1.	0.	0.	0.	0.	0.	0.	13.	29.	3.
143	29.	46.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3.	17.	1.	1.	6.	2.
	5739.	26278.	435.	2467.	11830.	153.	987.	6946.	70.	243.	2355.	23.	20.	46.	3.	2449.	39975.	303.	4485.	17021.	1526.
	13.	60.	0.	16.	77.	0.	14.	94.	0.	11.	102.	0.	7.	15.	0.	8.	132.	0.	3.	11.	0.

j. Computer Program I - Quantities of refuse and adjustment factors by material classification. In this program all loads were examined and each material in a load was sorted by material classification. The quantity of material in each classification was adjusted for seasonal and compaction factors for each material, one at a time.

The several columns of data produced are explained as follows:

(1) Material Received. The cubic yards and pounds are as received but added is the percent of each material to the total.

(2) Bulky as Received. Includes items as large as, or larger than, a desk or refrigerator, and pieces greater than 12' long other than a simple 2 x 4 or easily broken items. In general, it included items that could not easily be crushed or broken with a small farm tractor.

(3) Compaction Factor. The factors used to adjust "as received" loose quantities to "compacted in place" quantities.

(4) Compacted C.Y. These are the "as received" cubic yards multiplied by the compaction factor expressed as C.Y. and as % of total.

(5) Seasonal Adjustments. The factor used to adjust the quantities measured during the survey week to make these quantities representative of the entire year. COMP CY is the cubic yards as received and adjusted for compaction factor multiplied by the seasonal factor. The % CY which follows CY is the percentage of this material to the total after adjustment for compacting and seasonal factor. The POUNDS and % POUNDS are "as received" quantities adjusted for seasonal factor only. (Pounds cannot be compacted). CUBIC YARDS are the "as received" cubic yards adjusted for seasonal factor only. They are not compacted.

Program I was run for the totals for each facility and for the totals for all facilities. The program containing the total for all facilities is shown in Table II-17.

k. Computer Program J. Quantity of Refuse and Adjustments by Political Subdivision. This program is the same as Program I except that the political subdivision is substituted in place of material classification (and the factors were not reproduced). In this program each individual group that was listed in Program I was added for the political subdivision, found in Columns 61, 62 and 63 of the survey form, and the percent of the total of each group was listed for each political subdivision.

The totals for Programs I and J are the same. The program containing the total for all facilities is shown in Table II-18.

l. Computer Program K. Quantity of Refuse and Adjustments by Geographic Area. This program is the same as Program J except that geographic areas were substituted for Political Subdivisions. The totals for Program K are the same as the totals for Programs I and J. The program containing the total for all sites as shown in Table II-19.

m. Computer Program L - Centroids of Refuse by Material Classification. This program is primarily for the purpose of determining the centroids of materials which will be explained below; however, a summation of volumes and weights was included for convenience. This summation is the volume and weight of material normally stated in cubic yards and pounds per week, but in this case, the volumes and weights have been converted to annual quantities. The volume is acre feet per year adjusted for seasonal and compaction factors. The weight is tons per year adjusted for seasonal factor only.

Centroids were computed for both south and west coordinates. They were computed by dividing the sum of all of the products of coordinates x the load. by the sum of the load, where the load was expressed in both seasonally adjusted cubic yards and seasonally adjusted pounds.

$$C = \frac{(\text{Coordinate X CY})}{\Sigma\ \text{CY}} \quad \text{also} \quad \Sigma\ \frac{\text{Coordinate X Pounds}}{\text{Pounds}}$$

The coordinates are those recorded in columns 55 through 60 of the survey form. The cubic yards and pounds are "as received."

The centroids represent the single theoretical location of all of the material within a sort. This may be the centroid of a material, a site, or the entire Study Area, as appropriate.

In the typeout, the columns which are marked SUM are the summation of CY X Coordinate or TONS X Coordinate as appropriate. The columns marked CORD are the coordinates of a point on a map. They represent the distance south or west of base lines expressed in feet x 1000.

The program containing the total of all sites is shown in Table II-20.

n. Computer Program M - "As Received" - Quantities of Refuse by Day of the Week and by Type of Vehicle. In this program the "As Received" quantities are by days of the week and by type of vehicle. The program is completely self-explanatory. The total is for the total number of vehicles, cubic yards and pounds per day, and the total number of vehicles, cubic yards and pounds for all days. The program containing the total for all facilities is shown in Table II-21.

TABLE II-17 COMPUTER PROGRAM I.

TOTAL FOR ALL FACILITIES

QUANTITY OF REFUSE AND ADJUSTMENT FACTORS

BY MATERIAL CLASSIFICATION, FOR ALL DAYS

MATERIAL I	MATL RECEIVED			I	BULKY AS REC	I	COMPACTION		I	SEASONAL ADJUSTMENTS					I
	CU YD	% CY	POUNDS	% LBS	CU YD	POUNDS	FACTOR	CU YD	% CY	FACTOR	COMP CY	% CY	POUNDS	% LB	CU YD
1	194.	2.8	4666.	2.0	0.	0.	0.8	156.	1.0	0.6	93.	0.7	2800.	1.4	117.
2	559.	1.4	3394.	1.4	18.	106.	0.7	391.	2.6	0.6	235.	1.8	2012.	1.0	335.
3	1157.	3.0	28104.	11.8	0.	0.	0.8	925.	6.2	0.6	555.	4.2	16862.	8.3	694.
4	55.	0.1	1343.	0.6	0.	0.	0.6	33.	0.2	0.6	20.	0.1	806.	0.4	33.
5	539.	1.4	13800.	5.8	0.	0.	0.7	377.	2.5	0.6	226.	1.7	8280.	4.1	323.
6	1217.	3.1	19709.	8.3	0.	0.	0.7	852.	5.7	0.6	511.	3.8	11826.	5.8	730.
7	233.	0.6	5352.	2.2	0.	0.	0.9	209.	1.4	0.7	147.	1.1	3747.	1.8	163.
8	128.	0.3	3109.	1.3	0.	0.	0.9	115.	0.8	0.7	81.	0.6	2177.	1.1	90.
9	296.	0.8	2396.	1.0	0.	0.	0.5	148.	1.0	1.0	146.	1.1	2396.	1.2	296.
10	126.	0.3	852.	0.4	0.	0.	0.5	63.	0.4	0.9	57.	0.4	767.	0.4	114.
11	87.	0.2	585.	0.2	0.	0.	0.5	43.	0.3	0.9	39.	0.3	527.	0.3	78.
12	44.	0.1	141.	0.1	0.	0.	0.4	18.	0.1	0.6	11.	0.1	84.	0.0	26.
13	960.	2.5	2593.	1.1	0.	0.	0.3	288.	1.9	0.6	173.	1.3	1556.	0.8	576.
14	540.	1.4	3645.	1.5	29.	196.	0.5	270.	1.8	0.8	216.	1.6	2916.	1.4	432.
15	260.	0.7	1754.	0.7	0.	0.	0.5	130.	0.9	0.8	104.	0.8	1403.	0.7	208.
16	260.	0.7	834.	0.4	0.	0.	0.4	104.	0.7	0.8	83.	0.6	667.	0.3	208.
17	1146.	2.9	3162.	1.3	0.	0.	0.3	351.	2.4	0.8	281.	2.1	2529.	1.2	917.
18	772.	2.0	421.	0.2	0.	0.	0.1	78.	0.5	0.1	8.	0.1	42.	0.0	77.
19	633.	1.6	1414.	0.6	0.	0.	0.2	130.	0.9	0.6	78.	0.6	848.	0.4	380.
20	41.	0.1	1048.	0.4	0.	0.	0.8	48.	0.3	1.0	48.	0.4	1048.	0.5	41.
21	284.	0.7	6125.	2.6	0.	0.	0.6	337.	2.3	1.5	506.	3.8	9187.	4.5	426.
22	3.	0.0	52.	0.0	0.	0.	0.8	2.	0.0	1.0	2.	0.0	52.	0.0	3.
24	11.	0.0	64.	0.0	0.	0.	0.8	8.	0.1	1.0	8.	0.1	64.	0.0	11.
25	55.	0.1	2559.	1.1	0.	0.	0.5	28.	0.2	1.0	28.	0.2	2559.	1.3	55.
26	248.	0.6	1106.	0.5	0.	0.	0.2	55.	0.4	1.0	55.	0.4	1106.	0.5	248.
27	294.	0.8	190.	0.1	0.	0.	0.1	32.	0.2	1.0	32.	0.2	190.	0.1	294.
28	111.	0.3	1792.	0.8	0.	0.	0.1	11.	0.1	0.8	9.	0.1	1433.	0.7	88.
30	44.	0.1	578.	0.2	0.	0.	0.8	36.	0.2	1.0	36.	0.3	578.	0.3	44.
32	115.	0.3	1242.	0.5	0.	0.	0.6	138.	0.9	1.0	138.	1.0	1242.	0.6	115.
33	45.	0.1	599.	0.3	0.	0.	0.5	32.	0.2	0.8	25.	0.2	479.	0.2	36.
35	497.	1.3	6062.	2.5	0.	0.	0.9	447.	3.0	2.0	894.	6.7	12125.	6.0	994.
38	7.	0.0	115.	0.0	0.	0.	0.9	6.	0.0	1.0	6.	0.0	115.	0.1	7.
40	746.	1.9	4552.	1.9	0.	0.	0.3	436.	2.9	0.9	393.	2.9	4097.	2.0	672.
41	170.	0.4	1013.	0.4	0.	0.	0.3	97.	0.7	0.9	87.	0.7	912.	0.4	153.
42	9268.	23.8	51403.	21.6	0.	0.	0.2	3338.	22.4	0.9	3004.	22.6	46264.	22.7	8340.
43	5811.	14.9	17496.	7.3	0.	0.	0.2	1508.	10.1	0.9	1357.	10.2	15747.	7.7	5229.
44	12.	0.0	96.	0.0	0.	0.	0.7	8.	0.1	1.0	8.	0.1	96.	0.0	12.
45	6.	0.0	48.	0.0	0.	0.	0.7	4.	0.0	1.0	4.	0.0	48.	0.0	6.
46	5.	0.0	38.	0.0	0.	0.	0.7	3.	0.0	1.0	3.	0.0	38.	0.0	5.
50	7966.	20.5	17783.	7.5	0.	0.	0.2	1922.	12.9	1.0	1922.	14.4	17783.	8.7	7966.
51	480.	1.2	1050.	0.4	0.	0.	0.2	131.	0.9	1.0	131.	1.0	1050.	0.5	480.
52	160.	0.4	128.	0.1	0.	0.	0.2	32.	0.2	1.0	32.	0.2	128.	0.1	160.
53	383.	1.0	306.	0.1	0.	0.	0.2	77.	0.5	1.0	77.	0.6	306.	0.2	383.
54	228.	0.6	697.	0.3	0.	0.	0.2	46.	0.3	1.0	46.	0.3	697.	0.3	228.
55	132.	0.3	5651.	2.4	0.	0.	0.9	126.	0.8	1.0	126.	0.9	5651.	2.8	132.
56	476.	1.2	6514.	2.7	0.	0.	0.3	145.	1.0	1.0	145.	1.1	6514.	3.2	476.
57	1404.	3.6	2751.	1.2	0.	0.	0.5	756.	5.1	1.0	756.	5.7	2751.	1.4	1404.
58	82.	0.2	706.	0.3	0.	0.	0.9	91.	0.6	1.0	91.	0.7	706.	0.3	82.
59	105.	0.3	1260.	0.5	0.	0.	0.9	94.	0.6	1.0	94.	0.7	1260.	0.6	105.
60	36.	0.1	77.	0.0	0.	0.	0.3	11.	0.1	1.0	11.	0.1	77.	0.0	36.
61	80.	0.2	430.	0.2	0.	0.	0.2	16.	0.1	1.0	16.	0.1	430.	0.2	80.
62	31.	0.1	393.	0.2	0.	0.	0.9	33.	0.2	1.0	33.	0.2	393.	0.2	31.
63	205.	0.5	4319.	1.8	0.	0.	0.1	27.	0.2	1.0	27.	0.2	4319.	2.1	205.
70	62.	0.2	1090.	0.5	0.	0.	0.9	56.	0.4	1.0	56.	0.4	1090.	0.5	62.
71	21.	0.1	462.	0.2	0.	0.	0.9	19.	0.1	1.0	19.	0.1	462.	0.2	21.
72	19.	0.0	298.	0.1	0.	0.	0.9	17.	0.1	1.0	17.	0.1	298.	0.1	19.
80	50.	0.1	711.	0.3	0.	0.	0.6	45.	0.3	0.3	13.	0.1	213.	0.1	15.
	38900.	1.5	238040.	0.0	47.	302.	0.0	14901.	0.0	0.0	13322.	0.0	203754.	0.0	34463.

TABLE II-18 COMPUTER PROGRAM J.

TOTAL FOR ALL FACILITIES

QUANTITY OF REFUSE AND ADJUSTMENTS

BY POLITICAL SUBDIVISION, FOR ALL DAYS

CODE	POLITICAL SUBDIVISION DESCRIPTION I	MATERIAL AS RECEIVED			I	COMPACTED	I	SEASONAL ADJUSTMENTS				I
		CU YDS	% CY	POUNDS	% LB	CU YD	% CY	COMP CY	% CY	POUNDS	% LB	CUBIC YDS
1	OMAHA	25579.	65.8	151148.	63.5	9652.	64.8	8909.	66.9	134344.	65.9	23945.4
2	RALSTON	188.	0.5	860.	0.4	66.	0.4	58.	0.4	761.	0.4	165.2
3	IRVINGTON	55.	0.1	440.	0.2	21.	0.1	15.	0.1	300.	0.1	45.0
4	BENNINGTON	31.	0.1	147.	0.1	10.	0.1	9.	0.1	128.	0.1	25.8
8	WATERLOO	5.	0.0	11.	0.0	1.	0.0	1.	0.0	10.	0.0	4.2
9	ELKHORN	1.	0.0	2.	0.0	0.	0.0	0.	0.0	2.	0.0	0.7
11	MILLARD	339.	0.9	1987.	0.8	161.	1.1	138.	1.0	1637.	0.8	295.8
12	COUNCIL BLUFFS	8165.	21.0	50728.	21.3	3158.	21.2	2695.	20.2	40862.	20.1	7004.9
13	CARTER LAKE	281.	0.7	894.	0.4	86.	0.6	78.	0.6	801.	0.4	255.0
15	CRESENT	3.	0.0	84.	0.0	2.	0.0	1.	0.0	51.	0.0	2.0
18	LAKE MANAWA	45.	0.1	237.	0.1	19.	0.1	17.	0.1	217.	0.1	41.3
33	BELVIEW	146.	0.4	720.	0.3	45.	0.3	35.	0.3	550.	0.3	119.8
34	SAC	466.	1.0	2975.	1.2	200.	1.3	152.	1.1	2213.	1.1	317.2
35	PAPILLION	164.	0.4	1361.	0.6	75.	0.5	49.	0.4	859.	0.4	113.7
37	LAVISTA	58.	0.2	276.	0.1	22.	0.1	19.	0.1	237.	0.1	53.0
41	GRETNA	0.	0.0	1.	0.0	0.	0.0	0.	0.0	1.	0.0	0.1
50	DOUGLAS COUNTY	2857.	7.3	23749.	10.0	1209.	8.1	1004.	7.5	18819.	9.2	2496.7
51	SARPY COUNTY	460.	1.2	2099.	0.9	146.	1.0	117.	0.9	1673.	0.8	384.3
52	POTTAWATTAMIE COUNTY	81.	0.2	252.	0.1	20.	0.1	17.	0.1	221.	0.1	58.5
	TOTALS	38900.	0.0	238038.	0.0	14901.	0.0	13321.	0.0	203752.	0.0	35362.4

TABLE II-19 COMPUTER PROGRAM K.

TABLE II-19 COMPUTER PROGRAM K.

TOTAL FOR ALL FACILITIES

QUANTITY OF REFUSE AND ADJUSTMENTS BY GEOGRAPHIC AREA, FOR ALL DAYS

GEOGRAPHIC AREA I	MATERIAL AS RECEIVED			I	COMPACTED	I	SEASONAL ADJUSTMENTS				I
	CU YDS	% CY	POUNDS	% LB	CU YD	% CY	COMP CY	% CY	POUNDS	% LB	CUBIC YDS
2	5.	0.0	10.	0.0	1.	0.0	1.	0.0	6.	0.0	2.8
3	31.	0.1	147.	0.1	10.	0.1	9.	0.1	128.	0.1	25.8
6	7.	0.0	16.	0.0	1.	0.0	1.	0.0	15.	0.0	6.4
7	30.	0.1	415.	0.2	19.	0.1	11.	0.1	252.	0.1	16.7
8	846.	2.2	3962.	1.7	262.	1.8	234.	1.8	3522.	1.7	747.4
9	66.	0.2	291.	0.1	21.	0.1	18.	0.1	247.	0.1	55.6
10	56.	0.1	441.	0.2	22.	0.1	15.	0.1	301.	0.1	45.3
12	5.	0.0	11.	0.0	1.	0.0	1.	0.0	10.	0.0	4.2
13	5.	0.0	28.	0.0	2.	0.0	1.	0.0	21.	0.0	4.8
14	18.	0.0	240.	0.1	11.	0.1	7.	0.1	147.	0.1	12.3
15	609.	1.6	4010.	1.7	226.	1.5	188.	1.4	3177.	1.6	518.3
16	2299.	5.9	14501.	6.1	878.	5.9	735.	5.5	11713.	5.7	1929.1
17	5126.	13.2	34010.	14.3	2092.	14.0	2192.	16.5	32965.	16.2	4890.4
18	617.	1.6	1946.	0.8	168.	1.1	152.	1.1	1778.	0.9	556.9
19	9022.	23.2	46854.	19.7	3119.	20.9	2732.	20.5	39511.	19.4	8131.3
20	2758.	7.1	19948.	8.4	1261.	8.5	1274.	9.6	20052.	9.8	2577.8
21	1507.	3.9	8116.	3.4	554.	3.7	479.	3.6	6496.	3.2	1316.1
22	645.	1.7	8094.	3.4	341.	2.3	233.	1.8	5283.	2.6	479.1
24	8.	0.0	29.	0.0	4.	0.0	3.	0.0	21.	0.0	6.3
25	1169.	3.0	9378.	3.9	488.	3.3	419.	3.1	8181.	4.0	1044.5
26	953.	2.4	5602.	2.4	370.	2.5	333.	2.5	4879.	2.4	874.1
27	1069.	2.7	5166.	2.2	388.	2.6	346.	2.6	4564.	2.2	966.6
28	2568.	6.6	16354.	6.9	996.	6.7	854.	6.4	13827.	6.8	2188.8
29	68.	0.2	469.	0.2	28.	0.2	20.	0.1	320.	0.2	53.2
30	381.	1.0	1588.	0.7	118.	0.8	96.	0.7	1280.	0.6	322.4
31	88.	0.2	519.	0.2	30.	0.2	24.	0.2	411.	0.2	74.9
32	105.	0.3	477.	0.2	37.	0.2	26.	0.2	326.	0.2	77.4
36	0.	0.0	1.	0.0	0.	0.0	0.	0.0	1.	0.0	0.1
37	68.	0.2	931.	0.4	43.	0.3	27.	0.2	565.	0.3	44.1
38	16.	0.0	78.	0.0	6.	0.0	5.	0.0	66.	0.0	12.6
39	400.	1.0	2787.	1.2	192.	1.3	147.	1.1	2100.	1.0	311.0
40	47.	0.1	369.	0.2	17.	0.1	12.	0.1	274.	0.1	35.2
41	8.	0.0	19.	0.0	2.	0.0	2.	0.0	15.	0.0	8.0
118	4.	0.0	86.	0.0	2.	0.0	2.	0.0	52.	0.0	2.8
136	10.	0.0	25.	0.0	2.	0.0	2.	0.0	23.	0.0	9.3
137	469.	1.2	2471.	1.0	150.	1.0	119.	0.9	1885.	0.9	368.8
138	3182.	8.2	20357.	8.6	1211.	8.1	1031.	7.7	16802.	8.2	2687.9
139	4418.	11.4	27164.	11.4	1755.	11.8	1511.	11.3	21629.	10.6	3866.5
140	3.	0.0	16.	0.0	0.	0.0	0.	0.0	9.	0.0	2.5
142	151.	0.4	913.	0.4	55.	0.4	44.	0.3	706.	0.3	117.3
143	66.	0.2	213.	0.1	19.	0.1	17.	0.1	195.	0.1	60.9
TOTALS	38899.	0.0	238038.	0.0	14901.	0.0	13321.	0.0	203752.	0.0	34462.4

TABLE II-20 COMPUTER PROGRAM L.

TOTAL FOR ALL FACILITIES

CENTROIDS OF REFUSE BY MATERIAL CLASSIFICATION, FOR ALL DAYS

		ANNUAL SEASONALLY ADJUSTED		SOUTH COORDINATES				WEST COORDINATES			
CODE	MATERIAL DESCRIPTION	COMPACTED ACRE FEET	TONS	CUBIC YARDS SUM	CUBIC YARDS COORD	TONS SUM	TONS COORD	CUBIC YARDS SUM	CUBIC YARDS COORD	TONS SUM	TONS COORD
1	DEMO-MIXED NON COMBUST	32.02	7279.23	32047.	275.	38457.	275.	64468.	553.	77362.	553.
2	DEMO-MIXED COMBUSTABLE	7.57	5231.52	92012.	274.	27604.	274.	181131.	540.	54339.	540.
3	DIRT SAND OR GRAVEL	17.89	43841.47	185019.	267.	224795.	267.	369581.	533.	449041.	533.
4	ROCK	0.64	2095.74	8994.	271.	10928.	271.	17649.	532.	21444.	532.
5	BROKEN PAVEMENT OR SIDE WALK	7.30	21528.27	87063.	269.	111441.	269.	173185.	535.	221677.	535.
6	CONSTRUCTION MIXED	16.47	30746.74	201892.	277.	163533.	277.	401271.	550.	325029.	550.
7	STREET SWEEPINGS	4.73	9741.19	45108.	277.	51875.	277.	87556.	537.	100689.	537.
8	CATCH BASIN CLEANINGS	2.60	5659.14	24425.	273.	29676.	273.	46798.	522.	56860.	522.
9	WOOD	4.77	6229.89	80052.	271.	32421.	271.	152014.	514.	61567.	514.
10	LOGS 10 INCH DIA & GREATER	1.83	1994.50	30993.	273.	10460.	273.	60203.	530.	20318.	530.
11	LOGS & STUMPS LESS THAN 10 IN	1.26	1369.74	21429.	275.	7232.	275.	41365.	530.	13961.	530.
12	LIMBS & LEAVES CHIPPED	0.34	219.65	7475.	283.	1196.	283.	13694.	519.	2191.	519.
13	LIMBS & LEAVES NOT CHIPPED	5.57	4045.45	156892.	272.	21180.	272.	305569.	531.	41306.	532.
14	ELM LOGS 10 INCH DIA & GREATER	6.97	7587.64	120496.	279.	40667.	279.	230211.	532.	77696.	532.
15	ELM LOGS LESS THAN 10 INCH	3.35	3647.93	58116.	280.	19614.	280.	110726.	533.	37370.	533.
16	ELM LIMBS & LEAVES CHIPPED	2.69	1753.89	58011.	278.	9282.	278.	109676.	526.	17548.	526.
17	ELM LIMBS & LEAVES, NOT CHIP	9.06	6576.18	247988.	271.	34164.	270.	489788.	534.	67553.	534.
18	BRUSH	0.25	109.54	20774.	269.	567.	269.	41008.	531.	1119.	531.
19	GRASS & GARDEN TRIMMINGS	2.51	2206.00	102346.	270.	11442.	270.	204138.	538.	22833.	536.
20	PAUNCH MANURE	1.56	2725.79	11546.	284.	14728.	281.	22166.	546.	28792.	549.
21	PEN SWEEPINGS	16.30	23886.16	116731.	274.	126016.	274.	236246.	555.	254565.	555.
22	OTHER MEAT PACKING WASTES	0.08	134.94	861.	287.	745.	287.	1623.	541.	1404.	541.
24	DEAD ANIMALS	0.27	165.36	2951.	278.	885.	278.	5550.	524.	1665.	524.
25	SLAG	0.89	6652.98	14932.	271.	34672.	271.	25093.	528.	67553.	528.
26	TIRES & RUBBER PRODUCTS	1.78	2876.31	66860.	270.	14957.	270.	132733.	536.	29485.	533.
27	PLASTIC	1.02	493.35	79344.	270.	2565.	270.	151332.	515.	4683.	515.
28	OILS, TARS & ASPHALTS-LIQUID-	0.29	3726.76	23435.	265.	18983.	265.	46555.	531.	38033.	531.
30	BEANS OR GRAIN WASTES	1.15	1504.08	12193.	274.	7925.	274.	22917.	515.	14896.	515.
32	OTHER FOOD PROCESSING WASTE	4.45	3229.19	31493.	274.	17006.	274.	59612.	518.	32150.	518.
33	FRUITS & VEGTABLES	0.81	1245.37	9744.	271.	6496.	271.	18546.	515.	12284.	513.
35	ASHES & CINDERS	28.83	31524.17	263903.	266.	160979.	266.	524582.	528.	315554.	528.
38	OTHER FINE PARTICLES	0.21	299.05	1782.	251.	1443.	251.	3820.	538.	3094.	538.
40	GARBAGE & KITCHEN WASTE -DOM-	12.66	10651.09	180659.	269.	55122.	269.	344805.	513.	105065.	513.
41	GARBAGE & KITCHEN WASTE -COML-	2.82	2371.56	43440.	284.	12991.	285.	86000.	563.	25655.	563.
42	MIXED TRASH & REFUSE-INCL GARB	96.83	120282.81	2264245.	271.	627225.	271.	4547006.	545.	1260975.	545.
43	MIXED TRASH & REFUSE -NO GARB-	43.75	40941.73	1412561.	270.	213204.	271.	2805028.	536.	423962.	535.
44	INCINERATOR RESIDUE -DOM-	0.27	248.51	3115.	264.	1262.	264.	6357.	539.	2575.	539.
45	INCINERATOR RESIDUE,COML & IND	0.13	124.25	1693.	287.	686.	287.	3115.	525.	1263.	528.
46	INCINERATOR RESIDUE,MUNICIPAL	0.11	100.03	1302.	274.	527.	274.	2446.	515.	991.	515.
50	PAPER & CARDBOARD	61.96	46235.75	2153943.	270.	241095.	271.	4266879.	536.	477680.	537.
51	CANS	4.23	2728.77	130954.	273.	14309.	273.	249445.	519.	27068.	518.
52	FURNITURE COMBUST.	1.03	332.07	43142.	270.	1726.	270.	86785.	544.	3471.	544.
53	FURNITURE	2.47	795.99	103031.	269.	4121.	269.	202881.	530.	6115.	530.
54	MAJOR APPLIANCES	1.50	1813.26	60868.	267.	9310.	267.	119953.	526.	18343.	526.
55	HEAVY METAL SCRAP	4.05	14691.95	35453.	270.	76425.	270.	69465.	526.	145265.	526.
56	LIGHT METAL SCRAP	4.67	16936.85	128785.	270.	68136.	271.	251062.	527.	171907.	526.
57	WOOD CRATES	24.36	7153.13	380943.	271.	37345.	271.	758277.	540.	74276.	540.
58	GLASS & BOTTLES	2.93	1636.19	22029.	269.	9490.	269.	44468.	543.	19368.	543.
59	BATTERY CASE & AUTOMOTIVE	3.05	3275.98	28400.	270.	17040.	270.	55469.	528.	33282.	528.
60	AUTOMOBILE BODIES	0.34	199.79	10049.	282.	1085.	282.	19828.	557.	2141.	557.
61	WIRE	0.51	1117.58	22072.	277.	5946.	277.	41364.	520.	11174.	520.
62	CHEMICAL WASTE, DRY	1.05	1020.71	8554.	273.	5391.	275.	17517.	559.	11017.	561.
63	CHEMICAL WASTE, LIQ OR WET	0.86	11229.16	59592.	286.	61706.	286.	120217.	576.	124438.	576.
70	SEWAGE SLUDGE SOLIDS	1.81	2834.65	17425.	280.	15247.	280.	32697.	525.	28610.	525.
71	SEWAGE GRIT	0.61	1201.20	5817.	277.	6399.	277.	10983.	523.	12661.	523.
72	SEWAGE SCREENINGS	0.54	773.76	5123.	275.	4099.	275.	9619.	517.	7696.	517.
80	AGRICULTURAL WASTE	0.43	554.27	4138.	277.	2942.	276.	8150.	546.	5852.	545.
	TOTALS	*****	529746.94	9344127.	271.	2766705.	272.	18517152.	537.	5485408.	536.

TABLE II-21 COMPUTER PROGRAM M.

TOTAL FOR ALL FACILITIES

AS RECEIVED QUANTITIES OF REFUSE BY DAY OF THE WEEK AND BY TYPE OF VEHICLE

TOTALS AS RECEIVED

CODE	TYPE VEHICLE DESCRIPTION	MONDAY # VEH	MONDAY CU YDS	MONDAY POUNDS	TUESDAY # VEH	TUESDAY CU YDS	TUESDAY POUNDS	WEDNESDAY # VEH	WEDNESDAY CU YDS	WEDNESDAY POUNDS	THURSDAY # VEH	THURSDAY CU YDS	THURSDAY POUNDS	FRIDAY # VEH	FRIDAY CU YDS	FRIDAY POUNDS	SATURDAY # VEH	SATURDAY CU YDS	SATURDAY POUNDS	SUNDAY # VEH	SUNDAY CU YDS	SUNDAY POUNDS	TOTAL # VEH	TOTAL CU YDS	TOTAL POUNDS
1	P. P	151.	2405.	14372.	144.	2298.	14881.	153.	2445.	15869.	144.	2327.	13222.	134.	2200.	13995.	51.	865.	5876.	3.	46.	259.	780.	12586.	78474.
2	DUMP	120.	949.	10612.	135.	1128.	14374.	112.	900.	13246.	113.	966.	14753.	132.	1130.	14869.	45.	416.	3429.	7.	69.	411.	672.	5558.	71693.
3	VAN	49.	704.	1376.	55.	789.	2023.	32.	376.	1365.	54.	902.	2053.	51.	788.	2043.	41.	391.	1258.	17.	138.	491.	299.	4089.	10601.
4	LIGHT TRAILER	11.	26.	130.	10.	23.	58.	10.	33.	138.	10.	51.	349.	8.	19.	52.	45.	162.	576.	17.	48.	174.	111.	362.	1476.
5	HEAVY TRAILER OR SEMI	6.	212.	530.	7.	337.	963.	12.	256.	775.	3.	69.	252.	12.	365.	700.	8.	152.	307.	0.	0.	0.	48.	1390.	3526.
6	FLAT BED OR STAKE	81.	1208.	5596.	93.	1524.	8002.	90.	1326.	8150.	62.	874.	5119.	74.	1156.	7015.	91.	1563.	7505.	17.	248.	770.	508.	7899.	42157.
7	PICKUP	185.	862.	3209.	171.	829.	3357.	142.	802.	3700.	128.	639.	2893.	166.	728.	3534.	363.	1787.	7305.	184.	784.	2848.	1339.	6431.	26846.
8	AUTO OR STATION WAGON	61.	38.	76.	68.	33.	117.	42.	23.	90.	42.	24.	81.	58.	26.	78.	278.	184.	535.	122.	81.	254.	671.	409.	1231.
9	TRANSFER VEHICLE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.	44.	80.	0.	0.	0.	0.	0.	0.	1.	44.	80.
10	OTHER	1.	10.	154.	3.	47.	758.	1.	10.	154.	2.	19.	308.	2.	30.	478.	1.	5.	11.	0.	0.	0.	10.	119.	1063.
	TOTALS	673.	6414.	36054.	686.	7009.	44532.	594.	6171.	43487.	558.	5870.	39030.	638.	6485.	42844.	923.	5525.	26793.	367.	1413.	5207.	4439.	38884.	237940.

TABLE II-22 COMPUTER PROGRAM N.

TOTAL FOR ALL FACILITIES

AS RECEIVED QUANTITIES OF REFUSE BY DAY OF THE WEEK AND BY TYPE OF HAULER

TOTALS AS RECEIVED

CODE	TYPE HAULER DESCRIPTION	MONDAY # VEH	MONDAY CU YDS	MONDAY POUNDS	TUESDAY # VEH	TUESDAY CU YDS	TUESDAY POUNDS	WEDNESDAY # VEH	WEDNESDAY CU YDS	WEDNESDAY POUNDS	THURSDAY # VEH	THURSDAY CU YDS	THURSDAY POUNDS	FRIDAY # VEH	FRIDAY CU YDS	FRIDAY POUNDS	SATURDAY # VEH	SATURDAY CU YDS	SATURDAY POUNDS	SUNDAY # VEH	SUNDAY CU YDS	SUNDAY POUNDS	TOTAL # VEH	TOTAL CU YDS	TOTAL POUNDS
1	CONTRACTOR, GENERAL	42.	387.	5935.	55.	481.	8272.	37.	418.	4317.	32.	279.	4840.	33.	270.	4402.	33.	322.	4351.	0.	0.	0.	232.	2158.	32117.
2	CONTRACTOR, WRECKING	7.	33.	579.	10.	79.	1503.	18.	119.	1836.	7.	45.	713.	11.	53.	967.	7.	81.	894.	0.	0.	0.	60.	410.	6491.
3	ELM TREE REMOVAL	29.	312.	1339.	35.	587.	2573.	16.	255.	1149.	24.	325.	1200.	27.	415.	1574.	18.	213.	793.	3.	43.	115.	148.	2149.	8744.
4	COML HAULER, DOMESTIC ROUTE	183.	1988.	10273.	163.	1894.	9679.	116.	1630.	8777.	115.	1604.	8935.	132.	1721.	9145.	92.	865.	3629.	45.	229.	799.	846.	9932.	51237.
5	COML HAULER, COMMERCIAL ROUTE	104.	1192.	5628.	117.	1404.	5496.	120.	1393.	7161.	95.	1134.	4741.	86.	1161.	4299.	81.	1091.	4467.	17.	177.	697.	620.	7552.	32510.
6	COML HAULER, INDUSTRIAL ROUTE	1.	18.	75.	5.	60.	1453.	4.	48.	310.	4.	44.	206.	3.	103.	490.	1.	12.	191.	1.	9.	73.	19.	293.	2798.
7	COMMERCIAL, SINGLE SOURCE	71.	917.	2846.	57.	867.	4186.	63.	893.	4619.	66.	825.	2950.	95.	1159.	6658.	76.	1004.	4870.	7.	75.	150.	435.	5739.	26278.
8	INDUSTRIAL, SINGLE SOURCE	22.	429.	1523.	28.	573.	2593.	19.	234.	1190.	30.	432.	2490.	32.	546.	2963.	17.	204.	855.	5.	48.	209.	153.	2467.	11831.
9	PUBLIC, DOMESTIC	11.	176.	1098.	10.	165.	1036.	14.	203.	1410.	14.	217.	1328.	17.	185.	1239.	4.	40.	435.	0.	0.	0.	70.	987.	6546.
10	PUBLIC, COMMERICAL	3.	39.	330.	6.	72.	649.	1.	16.	59.	4.	44.	353.	7.	65.	944.	2.	8.	18.	0.	0.	0.	23.	243.	2355.
11	PUBLIC, INDUSTRIAL	0.	0.	0.	1.	1.	1.	0.	0.	0.	1.	9.	24.	0.	0.	0.	1.	11.	20.	0.	0.	0.	3.	20.	45.
12	OTHER PUBLIC VEHICLE	67.	491.	5237.	62.	444.	9820.	54.	431.	10139.	61.	565.	10028.	56.	567.	8671.	1.	2.	4.	2.	8.	20.	303.	2449.	39975.
13	PRIVATE CITIZEN, DOMESTIC	136.	431.	1191.	138.	383.	1271.	133.	529.	2437.	105.	349.	1222.	139.	300.	1492.	590.	1672.	6267.	287.	825.	3143.	1526.	4486.	17021.
	TOTALS	673.	6414.	36054.	686.	7009.	44532.	594.	6171.	43487.	558.	5870.	39030.	638.	6485.	42844.	923.	5525.	26793.	367.	1413.	5207.	4439.	38884.	237940.

o. Computer Program N - "As Received quantities of refuse by day of the week and by type of hauler. This program is the same as Program M except that the type of hauler is substituted for type of vehicle. The totals are the same as Program M. The Program containing the total for all facilities is shown in Table II-22.

F. VOLUME, WEIGHT AND VEHICLE ANALYSIS

1. General. Computer Programs A, B, E and I are the principal source of information concerning volumes and weights of waste material. They indicate when and by whom the materials were delivered, other information concerning vehicle types and the relative amount of material disposed of at the several landfill sites surveyed. This information will be of value in making detailed plans for operation of new sanitary landfill sites or transfer stations.

The following explanations, of a general nature, contain items of significance concerning the development of disposal facilities for the Study Area. From the large store of basic data, the detailed facts may be obtained for proper planning and design.

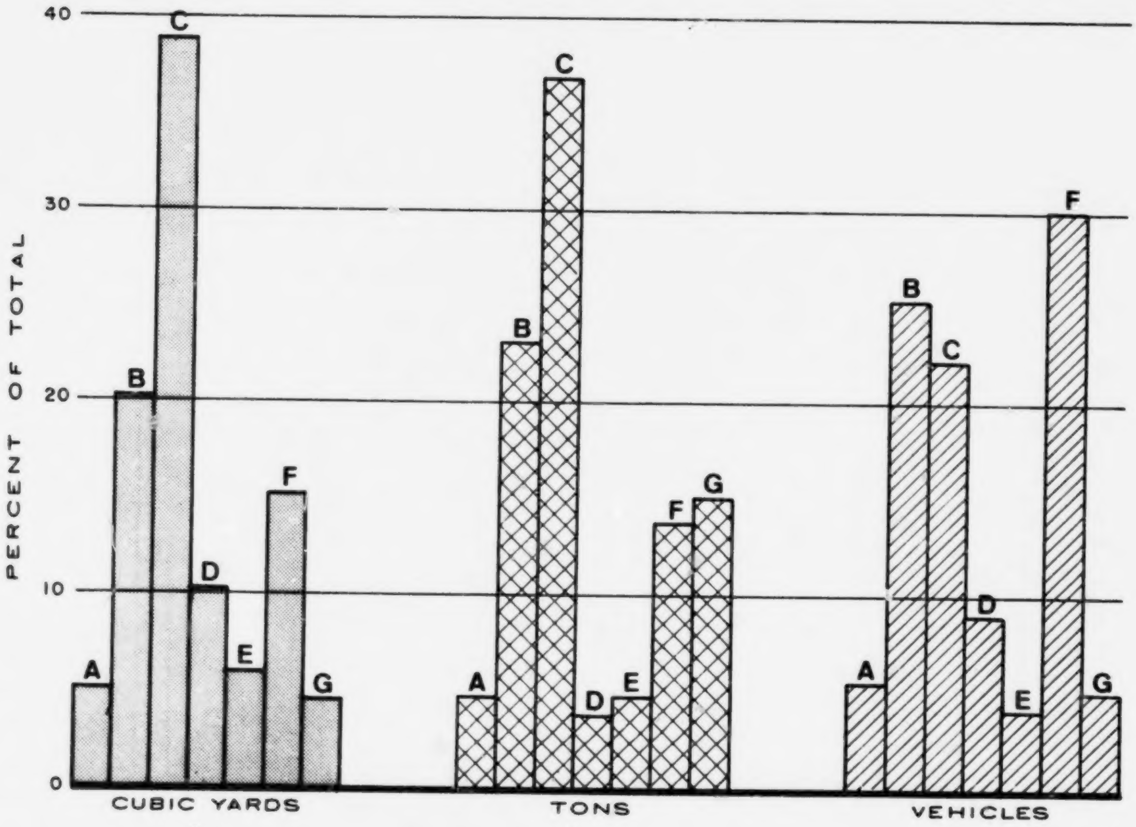
2. Comparing the Several Sites for Waste Quantities and Vehicular Traffic. Figure II-2 shows the percentage by volume and weight of material, and vehicular traffic at each of the six major landfill sites and one incinerator.

This figure graphically illustrates that Meese's Sanitary Landfill receives a higher tonnage and cubic yard input than any of the other sites. This is explained by the fact that this site receives practically all of the municipally collected domestic waste from Omaha and is strategically located in a position to receive much of Omaha's commercial and industrial solid waste.

The Council Bluffs Dump site has a higher vehicle count due to a large number of pick-up trucks that use this site. It has the third and fourth highest percentage of cubic yards and tons received, respectively.

Reasons for any unusual pattern can be found by examining the detailed computer programs.

3. Comparing the Several Vehicle Types for Waste Quantities and Vehicular Traffic. Figure II-3 shows the percentage by volume and weight of materials, and vehicular traffic for the ten different types of vehicles. It might be expected that most of the material going to a landfill site would be brought in packer trucks hauling waste from the residential dwellings and commercial establishments in the community. This is correct. Such waste is a major category and a major contributor as shown in the fiture. The largest volume is brought in packer trucks with the flat bed trucks bringing in the second largest volume. The flat bed trucks are used extensively to haul diseased elm logs and limbs.



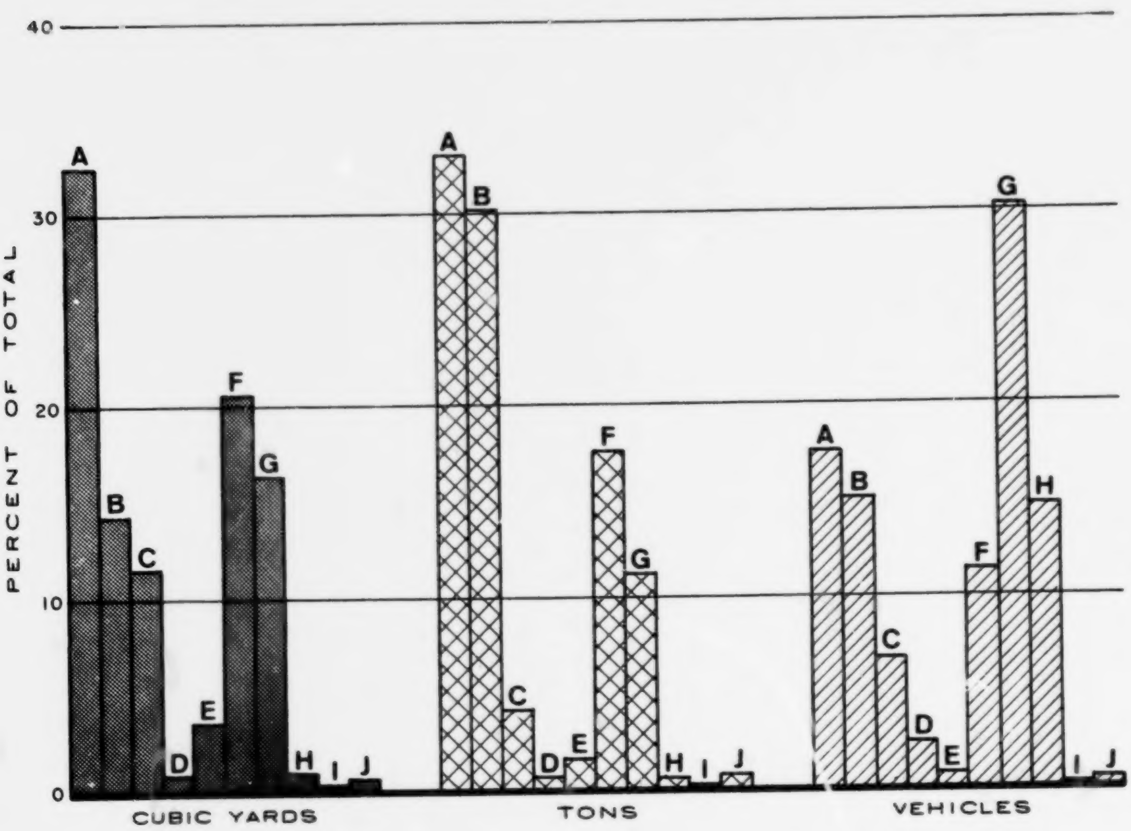
	DISPOSAL SITES	OPEN	HOURS
A	*SARPY COUNTY LANDFILL*	*7 Days/Week*	*0800 - 1700*
B	*DOUGLAS COUNTY LANDFILL*	*6 Days/Week*	*0800 - 1700*
C	*MEECE'S SANITARY LANDFILL*	*6 Days/Week*	*0700 - 1800*
		Sunday	*0800 - 1200*
D	*OMAHA INCINERATOR*	*7 Days/Week*	*0000 - 2300*
E	*COUNCIL BLUFFS LANDFILL*	*5 Days/Week*	*0800 - 1700*
F	*COUNCIL BLUFFS DUMP*	*7 Days/Week*	*0730 - 1800*
G	*OMAHA CITY DUMP*	*5 Days/Week*	*0700 - 1600*

For quantities and weights see EXHIBITS thru for individual sites and for the total.

One hundred per cent equals 38,884 CY/WK; 11,900 TONS/WK; 4439 VEH./WK; as received.

COMPARING THE SEVERAL SITES
FOR
WASTE QUANTITIES & VEHICULAR TRAFFIC

FIGURE II-2



VEHICLE TYPES

- **A** *PACKER TRUCK*
- **B** *DUMP TRUCK*
- **C** *VAN TRUCK*
- **D** *LIGHT TRAILER*
- **E** *HEAVY TRAILER OR SEMI TRAILER*
- **F** *FLAT BED TRUCK OR STAKE TRUCK*
- **G** *PICKUP TRUCK*
- **H** *AUTO OR STATION WAGON*
- **I** *TRANSFER TRAILER*
- **J** *OTHER*

COMPARING THE VEHICLE TYPES
FOR
WASTE QUANTITIES & VEHICULAR TRAFFIC

FIGURE II-3

The highest tonnage was brought in packer trucks. These trucks delivered approximately 33% of the total. Packer trucks were also the second highest in number of vehicles.

The dump truck is the second highest in tonnage delivered, fourth in cubic yards and third in the number of vehicles.

The largest traffic is in pick-up trucks. These vehicles deliver approximately 11% of the tonnage, approximately 16% of the volume, and represent approximately 30% of the traffic. This volume is "As Received" and usually is very loose.

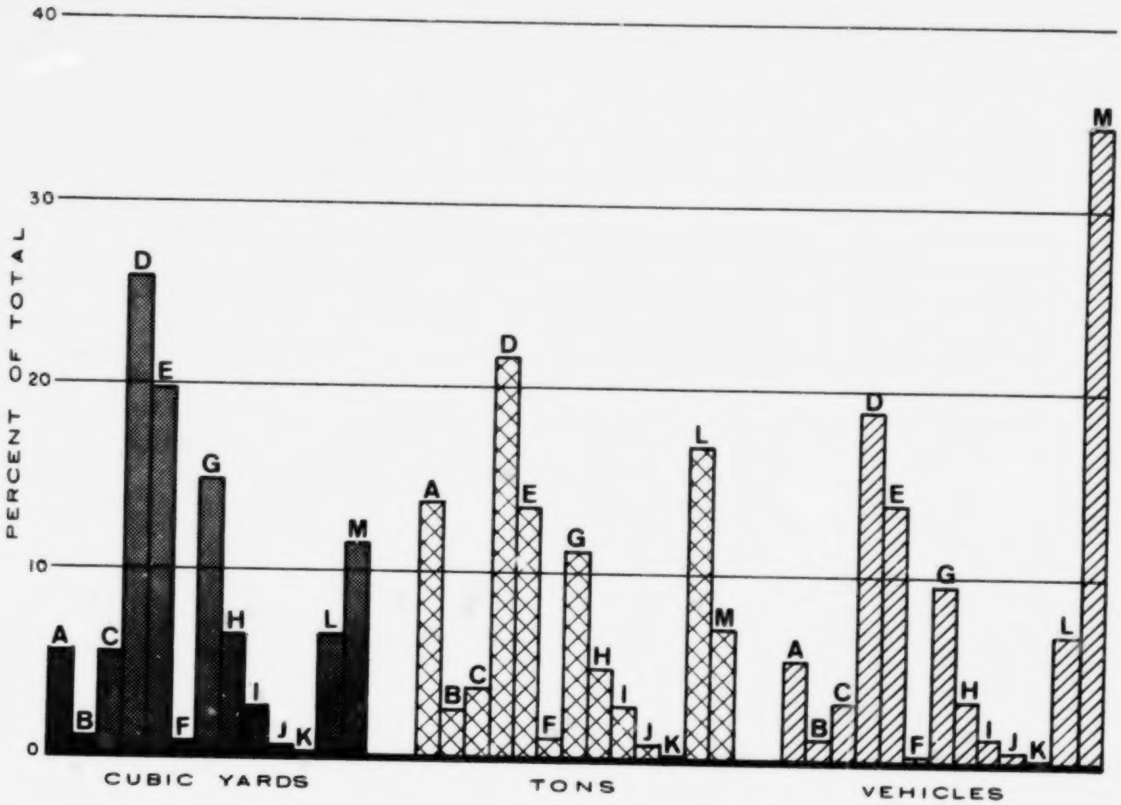
The automobile accounts for approximately 15% of the vehicle traffic but only for 1% of the volume and 0.5% of the tonnage received. The automobile adds to the traffic but deposits only a small amount of material. In another part of the report, it is recommended that automobiles be excluded from the main fill areas, but be allowed to dispose of their refuse in a special area without being charged for doing so, since they contribute very little to the volume and tonnage.

4. Comparing the Several Hauler Types for Waste Quantities and Vehicular Traffic. Figure II-4 shows the percentage by volume and weight of materials and vehicular traffic for the thirteen different types of haulers.

In this figure the largest volume and tonnage appears to be the Commercial Hauler, Domestic Route Type D. The figure accurately shows what the computer program reported, however, there is an error in this particular data. The survey technicians sometimes used Type D when Public Domestic Type I should have been used. Specifically, the Contractor collecting Omaha's domestic refuse was classed as Type D in lieu of Type I. He is a commercial collector in one sense of the term, but in this case, he was working in lieu of the municipality's own forces and as such should have been classed as Type I. It is possible and proper to combine the results of Types D and I. To use this data, consider the sum of Types D and I as the total domestic refuse which was collected by Public and Commercial Domestic haulers.

In this figure, the Private Citizen Domestic, Type M appears as the high traffic and relatively low quantity category. This can be accounted for in the large number of automobiles which bring small quantities of waste and an even larger number of pick-ups bringing relatively small loads, many of which are privately owned.

The reason for the extremely low quantity of waste from the general contractor and wrecking contractor in both volume and tonnage is that the majority of the contractors have their own disposal sites, as explained in Section B of this Part II.



HAULER TYPE

A *CONTRACTOR, GENERAL (General construction wastes)*
B *CONTRACTOR, WRECKING (General demolition wastes)*
C *ELM TREE REMOVAL (Diseased elm trees removed)*
D *COMMERCIAL HAULER, DOMESTIC ROUTE (Commercial route system, residential portion)*
E *COMMERCIAL HAULER, COMMERCIAL ROUTE (Commercial route system, commercial portion)*
F *COMMERCIAL HAULER, INDUSTRIAL ROUTE (Commercial route system, industrial portion)*
G *COMMERCIAL SINGLE SOURCE (Private single source, commercial establishments)*
H *INDUSTRIAL SINGLE SOURCE (Private single source, industrial establishments)*
I *PUBLIC DOMESTIC (Public source, domestic waste)*
J *PUBLIC COMMERCIAL (Public source, commercial waste)*
K *PUBLIC INDUSTRIAL (Public source, industrial waste)*
L *OTHER PUBLIC VEHICLE (Any other Government Vehicle)*
M *PRIVATE CITIZEN DOMESTIC (Private citizen, domestic waste)*

COMPARING THE HAULER TYPES
FOR
WASTE QUANTITIES & VEHICULAR TRAFFIC

FIGURE II-4

5. Comparing the Seven Days of the Week for Waste Quantities and Vehicular Traffic. Figure II-5 shows that the quantities and traffic are reasonably uniform from Monday through Friday with Tuesday being slightly greater. Saturday shows a reduced volume and tonnage but increased vehicular count. This can be explained by the reduced commercial, industrial and municipal activity and an increase in personal hauling. Reference to the detailed data shows that a high percentage of the Saturday and Sunday traffic is pickups and automobiles. This is particularly true at the Council Bluffs dump site which is open all day Saturday and Sunday.

The recommended new sites are planned for a 6-day week, Monday through Saturday. It is contemplated that special facilities will be provided for automobiles which will be available 24-hours per day, seven days per week.

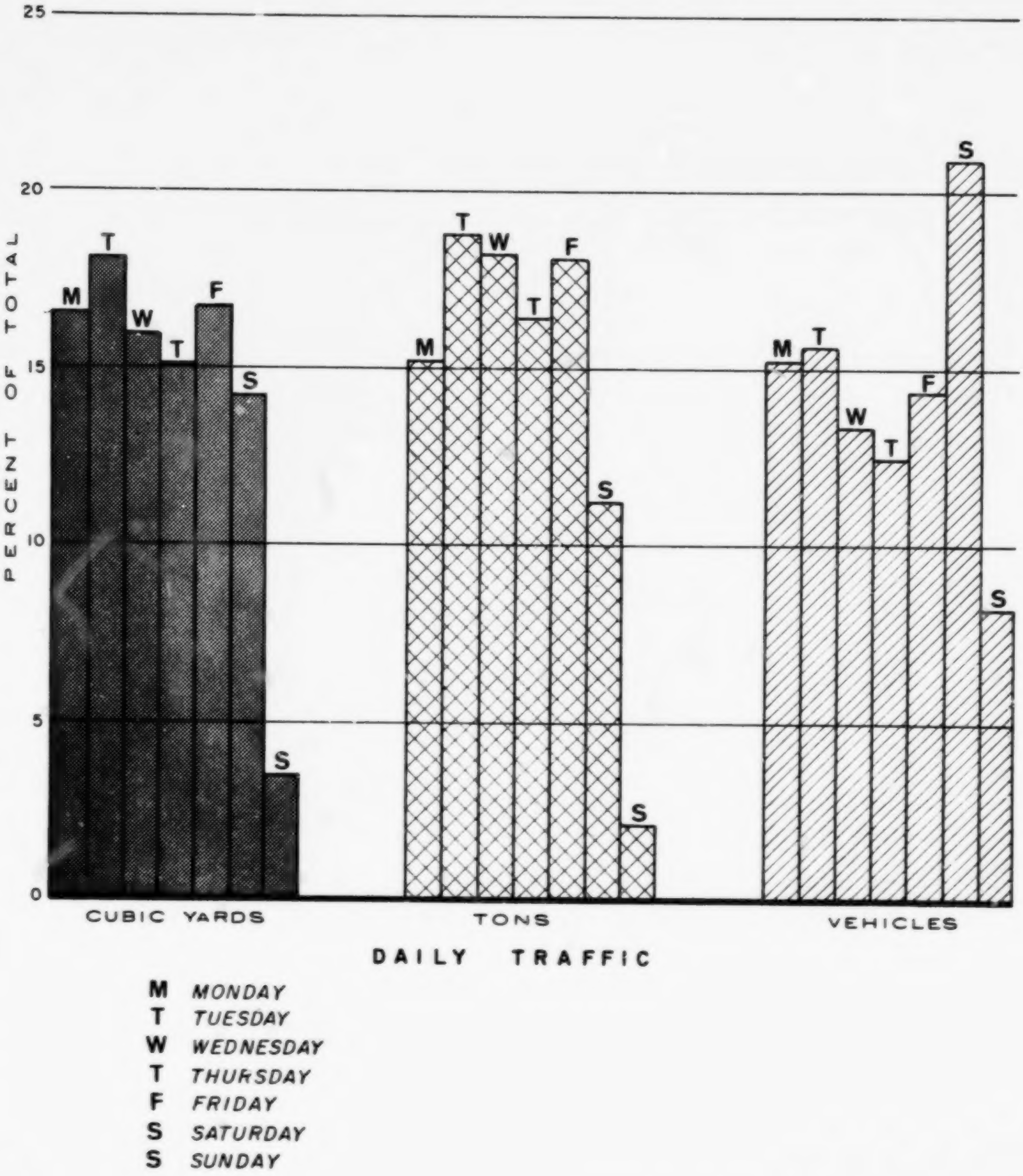
6. Comparing the Hours of the Day for Waste Quantities and Vehicular Traffic. Figure II-6 shows that the peak hour for volume, tonnage and vehicle count is 1100 hours (11:00 A.M.). The second highest peak is 1500 hours (3:00 P.M.).

The quantity and traffic are low prior to 0700 and after 1800 hours. Some of the sites are not open before 0800 and close before 1800 hours; however, this chart indicates no large demand for service during these early and late hours. Notice there is no large backlog waiting at 0800. If there was such a backlog, there probably would be a dropback between 0800 and 0900. Instead, there is a continuing increase until 1100. The rate slacks at the peak of 1100 and drops down at 1200 hours and increases again to the second highest peak at 1500 hours. Then the rate slackens continuously to 1800 hours.

Our recommended hours for landfill sites are from 0800 to 1800 hours. Special arrangements can be made for haulers inconvenienced by this schedule.

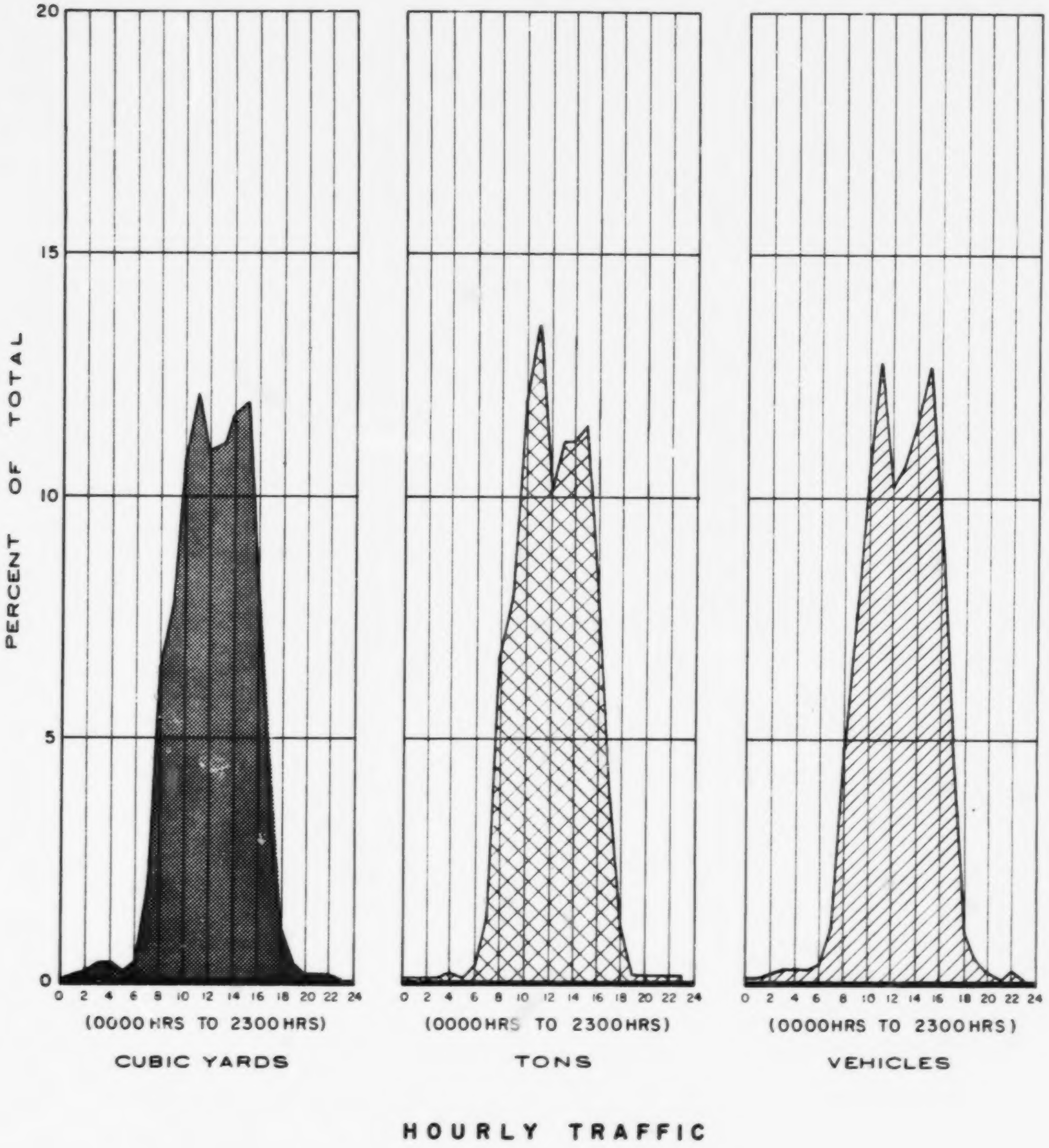
7. Comparing the Hours of the Day and the Vehicular Count for the Several Types of Vehicles. Figure II-7 shows the traffic pattern throughout the day by vehicle type.

This figure can be very useful in the design of landfill facilities and in making policy decisions. When providing scale capacity and other functions, it is necessary to know the magnitude and timing of peak operations and the type of hauler and vehicle involved. For example, it can be seen that automobiles, with 15% of the traffic, have a peak rate of arrival at 1500 hours. This peak coincides with a total traffic peak shown in Figure II-6. Anything which reduces the number of automobiles at this time, significantly reduces the peak traffic. We have recommended automobiles be provided special facilities which will eliminate them from the traffic using the scales and other critical facilities. They would also have a significant effect on the 1100 hour peak.



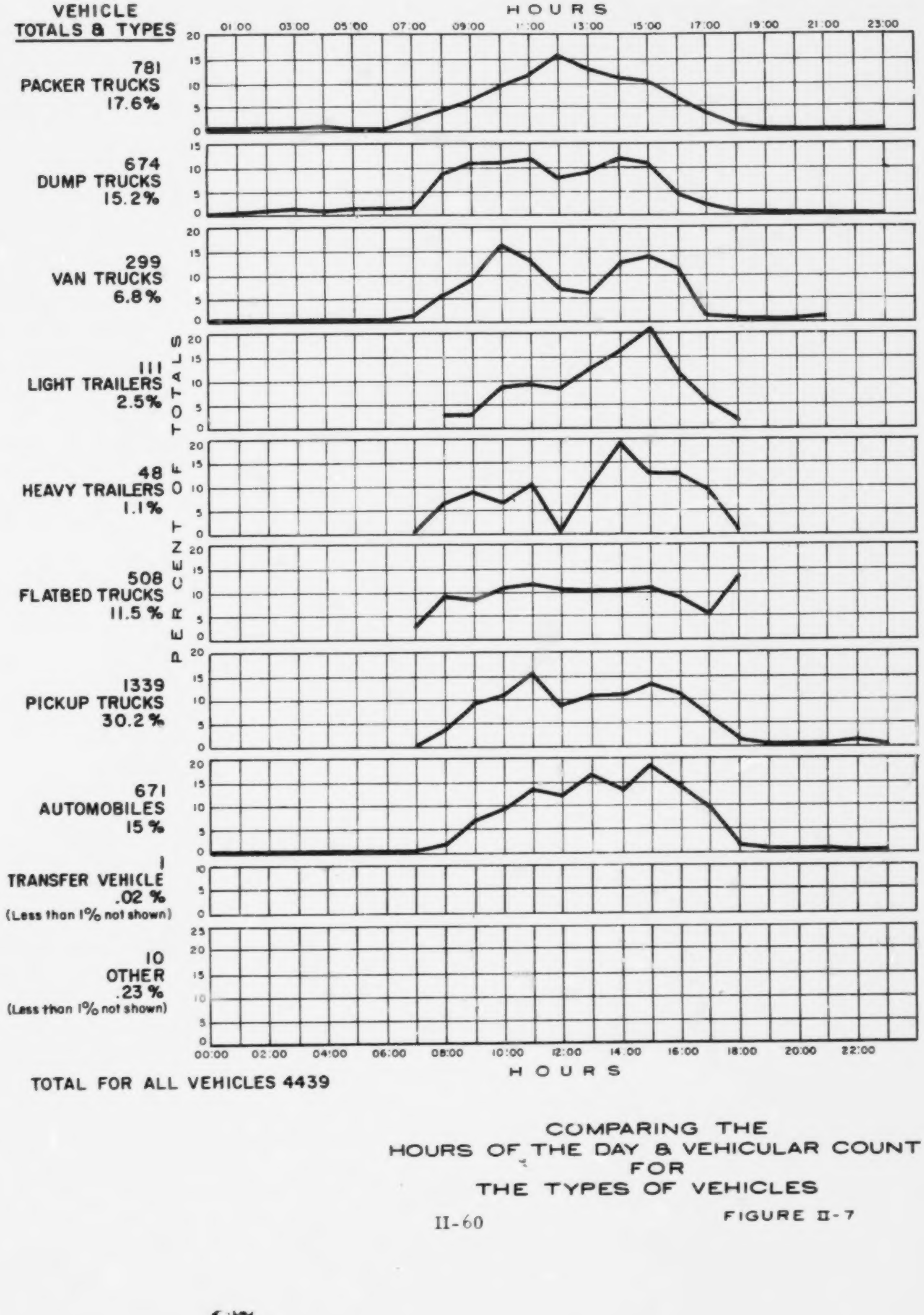
COMPARING THE SEVEN DAYS OF THE WEEK
FOR
WASTE QUANTITIES & VEHICULAR TRAFFIC

FIGURE II-5



COMPARING THE HOURS OF THE DAY
FOR
WASTE QUANTITIES & VEHICULAR TRAFFIC

FIGURE II-6



COMPARING THE
HOURS OF THE DAY & VEHICULAR COUNT
FOR
THE TYPES OF VEHICLES

FIGURE II-7

In the case of pick-up trucks, representing 30% of the traffic, a peak at 1100 and again at 1500 hours also coincides with the total traffic peaks. In fact, the automobiles and pick-up are largely responsible for these two peaks. It would be possible to establish a flat rate fee for pick-up trucks or pick-up trucks without side boards. If this were done, these trucks would not have to be weighed, thus reducing scale congestion. Of course, enough pick-ups should be weighed during non-peak periods to establish a typical weight for record purposes.

Packer trucks show a peak at noon. Since these vehicles represent 17.6% of the traffic and carry the largest single portion of the total volume and tonnage, their arrival should be planned and facilities provided to prevent a traffic back-up. They should be given special consideration for two other reasons as well. These are self-unloading vehicles which can be dumped rapidly, thus avoiding a prolonged stay in the congested area at the active fill face. Non-self-unloading vehicles, by contract, must be unloaded by hand and remain at the active fill face for a considerably longer time. Packer trucks also usually carry a multiple man crew. It is particularly important to the packer truck operator to move into the landfill and out again as soon as possible to reduce unproductive time of idle crew members.

G. ORIGIN OF LANDFILL WASTES

1. Centroids. Computer Program L determined the centroid of waste for each material classification for the sum of all days for each site and for all days at all sites. The centroid is the theoretical point from which the material originated. The centroid of waste for each site surveyed is as follows:

Origin of Wastes

Site	Centroid
Sarpy County Sanitary Landfill	35th & Edna, Sarpy County
Douglas County Sanitary Landfill	76th & Pacific, Omaha
Meese's Sanitary Landfill	38th & California, Omaha
Omaha Municipal Incinerator	20th & Harney, Omaha
Council Bluffs Landfill	7th St. & 8th Avenue, Council Bluffs
Council Bluffs Dump	7th St. & 2nd Avenue, Council Bluffs
Omaha City Dump	18th & Cuming, Omaha

The centroid for the sum of all days and all sites, which includes all material brought to the seven sites surveyed, was found to be located near the intersection of 29th & Harney Streets, Omaha.

2. Geographic Area as Origins of Waste. The entire Study Area was divided into many geographic areas as described in Section E. The material quantities originating in each of the geographic areas is shown in Figure III-1. This information is used in site simulations described in Part III of this report.

3. Political Subdivisions as Origins of Waste. Computer Programs C, G and J shown in Table II-11, 15 and 18 respectively lists the waste material from each of the political subdivisions which contributed waste to any of the seven major disposal facilities surveyed. These materials are further broken down into: Types of Vehicles; Types of Haulers; and As Received and Adjusted Quantities.

Table II-23 is an excerpt from Table II-18 showing the "As Received" quantities and the percentage of these quantities received from each political subdivision. Wastes originating within the City of Omaha were approximately equal to two-thirds of the total. The sum of those originating within Omaha, Council Bluffs and the unincorporated part of Douglas County were approximately equal to 94 percent.

TABLE II-23

Comparison of Wastes as Received from Political Sub-Divisions

Computer Program J

Political Sub-Division	Cubic Yards	% of Total	Tons	% of Total
1. Omaha	25,579	65.8	7,557	63.5
2. Ralston	188	0.5	43	0.4
3. Irvington	55	0.1	22	0.2
4. Bennington	31	0.1	7.3	0.1
8. Waterloo	5	0.0	0.5	0.0
9. Elkhorn	1	0.0	0.1	0.0
11. Millard	339	0.9	99	0.8
12. Council Bluffs	8,165	21.0	2,536	21.3
13. Carter Lake	281	0.7	45	0.4
15. Crescent	3	0.0	4.2	0.0
18. Lake Manawa	45	0.1	12	0.1
33. Bellevue	146	0.4	36	0.3
34. SAC	406	1.0	149	1.2
35. Papillion	164	0.4	68	0.6
37. LaVista	58	0.2	14	0.1
50. Douglas County	2,857	7.3	1,187	10.0
51. Sarpy Co.	460	1.2	105	0.9
52. Pottawattamie County	81	0.2	13	0.1
Totals	38,900	100%	11,891	100%

I. Measured Area. The total waste measured at the major disposal facilities, during landfill surveys described in Section F, are shown in Table II-24, Line a., Columns 11 and 14. These were taken directly from the computer programs and are referred to as this 1968 measured quantity. In Line b., Columns 11 and 14, are shown the estimated additional quantities of waste which were disposed of on-site, that would have been delivered to these facilities during 1968, if more strict regulations and controls concerning sanitary landfills and air pollution had been in effect and enforced. These latter quantities are referred to as on-site or b. Quantities. The sum of Lines a. and b., the measured quantities and on-site quantities, are the 1968 annual rate of disposal of solid waste in the "Measured Area" which contributed waste to the major disposal facilities surveyed. These totals which appear in Line 1968 of Table II-24 are equal to 919,000 cubic yards and 681,000 tons.

The line b. quantities were developed in the Commercial and Industrial Survey and other studies described in Sections B, C and D. They also contain an adjustment for materials disposed of at the Bellevue Landfill. The Bellevue population was included in the Measured Area population but disposed of material at their own landfill. By adding Bellevue quantities into the on-site quantities in Line b., their waste and population were included in the measured area.

The measured area can be described as the urban part of the Study Area and includes: Bellevue, Bennington, Boys Town, Carter Lake, Council Bluffs, Crescent, Elkhorn, Irvington, LaVista, Millard, Offutt, Omaha, Papillion, Ralston, Waterloo and eastern Douglas County. It contains a population of 499,200 representing 94.4% of the total population of the Study Area.

The 1968 waste quantities in the measured area shown in Table II-24 have been divided into four categories: Municipal Wastes, Domestic Wastes, Commercial and Industrial Wastes, and Special Tree Wastes. This was done to facilitate future projection which is discussed in Section J.

a. Municipal Wastes. The wastes included in this category are those which vary directly with the size of the city and the number of people, and are not likely to have a per capita increase. People dispose of certain materials at an increasing rate per person; however, the materials which are included in this category are likely to increase at a straight line rate in direct proportion to the population. Included in the Municipal Waste category are the materials shown in Table II-25. This municipal portion of the total waste measured during the landfill surveys is shown in Table II-24, Line a. The line b. quantities shown are those representing Bellevue's Municipal waste. The total estimated Municipal Waste for the measured area, to be disposed of at public sites in 1968, was 121,400 C.Y. compacted and seasonally adjusted and 144,300 tons seasonally adjusted.

TABLE II - 24

ANNUAL QUANTITIES & ACCUMULATIONS OF REFUSE FOR MEASURED AREA[c]

YEAR	POPULATION	MUNICIPAL WASTES		DOMESTIC WASTES		COMM/INDUS WASTES		SPECIAL TREE WASTES		TOTAL WASTES					YEAR
		VOLUME C Y	WEIGHT TONS	VOLUME C Y	WEIGHT TONS	VOLUME C Y	WEIGHT TONS	VOLUME C Y	WEIGHT TONS	VOLUME C Y x 1000	VOLUME ACRE FEET	ACCUMULATED ACRE FEET	WEIGHT TONS x 1000	ACCUMULATED TONS x 1000	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
a		116,500	138,600	360,500	175,000	180,100	197,000	35,600	19,600	693			530		a
b		4,900	5,700	36,700	17,800	59,900	28,200	124,000	99,500	226			151		b
1968	499,200	121,400	144,300	397,200	192,800	240,000	225,200	159,600	119,100	919	570	570	681	681	1968
1969	507,500	123,400	146,700	411,800	199,900	252,000	236,500	153,600	119,100	947	587	1157	702	1383	1969
1970	515,800	125,400	149,100	426,400	207,000	264,000	247,800	159,600	119,100	975	604	1761	723	2106	1970
1971	524,100	127,500	151,500	440,900	214,000	276,000	259,100	159,600	119,100	1,004	622	2383	744	2850	1971
1972	532,400	129,500	153,900	455,500	221,100	283,000	270,400	159,600	119,100	1,033	640	3023	765	3615	1972
1973	540,800	131,500	156,400	470,100	228,200	300,000	281,700	---	---	902	559	3582	666	4281	1973
1974	549,000	133,600	158,800	484,700	235,300	312,000	293,000	---	---	930	577	4159	687	4968	1974
1975	557,400	135,600	161,200	499,200	242,300	324,000	304,300	---	---	959	594	4753	708	5676	1975
1976	565,700	137,600	163,600	513,800	249,400	336,000	315,600	---	---	987	612	5365	729	6405	1976
1977	574,000	139,600	166,000	528,400	256,500	348,000	326,900	---	---	1,016	630	5995	750	7155	1977
1978	582,300	141,700	168,400	543,000	263,600	360,000	338,200	---	---	1,045	648	6643	770	7925	1978
1979	590,600	143,700	170,800	557,500	270,600	372,000	349,500	---	---	1,073	665	7308	791	8716	1979
1980	598,900	145,700	173,200	572,100	277,700	384,000	360,800	---	---	1,102	683	7991	812	9528	1980
1981	607,300	147,800	175,600	586,700	248,000	396,000	372,100	---	---	1,130	700	8691	832	10,360	1981
1982	615,600	149,800	178,000	601,300	291,900	408,000	383,400	---	---	1,159	718	9409	853	11,213	1982
1983	623,900	151,800	180,400	615,900	298,900	420,000	394,700	---	---	1,188	736	10,145	874	12,087	1983
1984	632,200	153,800	182,900	630,400	306,000	432,000	406,000	---	---	1,216	754	10,899	895	12,982	1984
1985	640,500	155,900	185,300	645,000	313,100	444,000	417,300	---	---	1,245	772	11,671	916	13,898	1985
1986	648,800	157,900	187,700	659,600	320,200	456,000	428,600	---	---	1,273	789	12,460	937	14,835	1986
1987	657,100	159,900	190,100	674,200	327,200	468,000	439,900	---	---	1,302	807	13,267	957	15,792	1987
1988	665,400	161,900	192,500	688,700	334,300	480,000	451,200	---	---	1,331	825	14,092	973	16,770	1988
1989	673,800	164,000	194,900	703,300	341,400	492,000	462,500	---	---	1,359	842	14,934	999	17,769	1989
1990	682,100	166,000	197,300	717,900	348,500	504,000	473,800	---	---	1,388	860	15,794	1020	18,789	1990
1991	690,400	168,000	199,700	732,500	355,500	516,000	485,100	---	---	1,416	878	16,672	1040	19,829	1991
1992	698,700	170,000	202,100	747,000	362,600	528,000	496,400	---	---	1,445	896	17,568	1061	20,890	1992
1993	707,000	172,100	204,600	761,600	369,700	540,000	507,700	---	---	1,474	914	18,482	1082	21,972	1993
1994	715,300	174,100	207,000	776,200	376,800	552,000	519,000	---	---	1,502	931	19,415	1103	23,075	1994
1995	723,600	176,100	209,400	790,800	383,900	564,000	530,300	---	---	1,531	949	20,362	1124	24,199	1995

a AS MEASURED AT PUBLIC DISPOSAL FACILITIES, 1968
b ADDITIONAL MATERIAL FROM PRESENT-ON-SITE DISPOSAL OPERATIONS, 1968
c MEASURED AREA REPPESENTS 94.4% OF THE TOTAL AREA POPULATION

NOTE ALL VOLUMES ARE ADJUSTED FOR SEASONAL VARIATIONS AND COMPACTION
ALL WEIGHTS ARE ADJUSTED FOR SEASONAL VARIATIONS
SEE TABLE II - 26 FOR TOTAL AREA

b. Domestic Wastes. The wastes in this category includes those types of wastes which normally originate in the dwelling units in the Study Area and include garbage, rubbish and yard waste. The quantities shown in Table II-25 are those of the three hauler classification which include domestic waste. The domestic portion of the total waste measured during the landfill survey is shown in Table II-24, Line a. The additional material now being disposed of on-site by burning was estimated in Section C, and is 6% of the measured quantities. The additional material is included in the total materials to be expected at a sanitary landfill facility and is shown in Line b. The total estimated domestic wastes for the measured area for 1968 is 397,200 cubic yards and 192,800 tons.

c. Special Tree Wastes. This category of wastes includes the quantities of waste wood which are the result of the Dutch Elm Disease, as discussed in Section D.3, and includes those material classifications shown in Table II-25. The special tree waste portion of the total waste quantities measured during the surveillance are shown in Table II-24, Line a. The additional material presently disposed of on-site, which can be expected at a public disposal facility in the future is shown in Line b. The total estimated special tree waste for the measured area for 1968 is 159,600 cubic yards and 119,100 tons.

d. Commercial and Industrial Waste. This category of waste includes all waste not included in the three previous categories of: Municipal, Domestic and Special Tree Waste. The quantities measured during the surveillance is shown in Table II-25. The C & I portion of the total waste measured during the landfill survey is shown in Table II-24, Line a. In the C & I surveys described in Section B, it was estimated that the 1968 on-site disposal which can be expected to be sent to public disposal facilities was equal to 18.8% of the volume and 11.3% of the weight of the present measured quantities and shown in Table II-24, Line b. The total estimated Commercial and Industrial wastes for the measured area for 1968 is 240,000 cubic yards and 225,200 tons.

TABLE II-25. MAJOR CATEGORIES OF WASTE

Material Class Municipal Waste	Per Week C.Y.**	Per Week Pounds*	Per Year C.Y.**	Per Year Lb.*
1	93	380,000		
2	235	201,200		
3	555	1,686,200		
4	20	80,600		
5	226	828,000		
6	511	1,182,600		
7	147	374,700		
8	81	217,700		
10	57	76,700		
11	39	52,700		
12	11	8,400		
13	173	155,600		
70	56	109,000		
71	19	46,200		
72	17	29,800		
73	--	--		
	2,240	5,329,400	116,500	277,128,000 (138,600 Tons)
Hauler Class Domestic Waste				
4	4,470	46,113		
9	444	5,891		
13	2,019	15,319		
	6,933	67,323	360,500	350,079,000 (175,000 Tons)
Material Class Special Tree Waste				
14	216	291,800		
15	104	140,300		
16	83	66,700		
17	281	252,900		
	684	751,700	35,600	39,088,000 (19,600 Tons)

Commercial and Industrial Waste

	C.Y. per Yr.**	Tons per Yr*	C.Y. per Yr.**	Tons per Yr.*
Total Measured Waste			692,700	529,700
Municipal Waste	116,500	138,600		
Domestic Waste	360,500	175,000		
Special Tree Waste	35,600	19,600		
Sub-Total			-512,600	-333,200
Commercial and Industrial Waste			180,100	196,500

*Adjusted for Seasonal Variation
**Adjusted for Seasonal Variation and Compaction

2. The Total Study Area. The total Study Area has a population of 528,800 as compared to 499,200 which is the population of the measured area discussed in preceding paragraph 1. To obtain present quantities of the total area, those quantities for the measured area were increased by the ratio of 528,800 to 499,200 and are shown in Table II-26. The 1968 rate of disposal for public disposal facilities for the total Study Area is equal to a volume of 973,000 cubic yards, compacted in-place and seasonally adjusted and a weight of 721,000 tons seasonally adjusted.

I. FUTURE QUANTITIES

1. General. Future quantities are estimated based on annual increased in the present quantities. The major categories of present waste and the annual estimated increase are as follows:

Municipal Wastes	1.92%
Domestic Wastes	4%
Commercial and Industrial	5%
Special Tree Waste	Fixed Quantity

The annual quantities and accumulated quantities of refuse for 1968 through 1995 for the Measured Area are shown in Table II-24.

2. Municipal Wastes. The wastes in this category are those which vary directly as the size of the community, which is estimated to vary directly with the population. Therefore, the increase in this category is estimated to be 1.92% per year which is the same as the annual increase in population. The 1.92% is a straight line average between the years 1960 and 1995.

3. Domestic Waste. Domestic wastes will increase directly as the population increases plus an annual increase in the per capita rate of waste. There are various estimates which predict the rate of increase in per capita waste will increase 50% from 1960 to 1985. This is approximately equal to 2% per year.

Long-term data are difficult to find and when found are difficult to use. The conditions under which the data were collected and the type of data included is usually unknown. Two percent per year increase appears reasonable; therefore, we have used a rate approximately equal to this amount.

The total increase in annual quantities for Domestic waste is approximately 2% for population increase and approximately 2% for the per capita rate increase for a total of 4% per year.

TABLE II-26

ANNUAL QUANTITIES AND ACCUMULATION OF REFUSE FOR TOTAL STUDY AREA

MEASURED AREA							ADDITIONAL (OUTLYING) AREA						TOTAL STUDY AREA						
YEAR	POPULATION	VOLUME C.Y. x 1000	VOLUME ACRE FEET	ACCUM ACRE FEET	WEIGHT TONS x 1000	ACCUM TONS x 1000	POPULATION	VOLUME C Y x 100	VOLUME ACRE FEET	ACCUM ACRE FEET	WEIGHT TONS x 1000	ACCUM TONS x 1000	POPULATION	VOLUME CY x 1000	VOLUME ACRE FEET	ACCUM ACRE FEET	WEIGHT TONS x 1000	ACCUM TONS x 1000	YEAR
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1968	499,200	919	570	570	681	681	29,600	54	34	34	40	40	528,800	973	604	604	721	721	1968
1969	507,500	947	587	1157	702	1383	30,100	56	35	69	41	81	537,600	1,003	622	1,226	743	1,464	1969
1970	515,800	975	604	1761	723	2106	30,600	58	36	105	43	124	546,400	1,033	640	1,866	766	2,230	1970
1971	524,100	1,004	622	2383	744	2850	31,100	59	37	142	44	168	555,200	1,063	659	2,525	788	3,018	1971
1972	532,400	1,033	640	3021	765	3615	31,600	61	38	180	45	213	564,000	1,094	678	2,303	810	3,827	1972
1973	540,800	902	559	3582	660	4281	32,000	53	33	213	39	252	572,800	955	592	3,795	699	4,526	1973
1974	549,000	930	577	4159	687	4968	32,600	55	3	247	41	293	581,600	985	611	4,406	728	5,246	1974
1975	557,400	959	594	4757	708	5676	33,000	57	35	282	42	335	590,400	1,016	629	5,039	750	5,996	1975
1976	565,700	987	612	5365	729	6405	33,600	58	36	318	43	378	599,300	1,045	648	5,683	772	6,768	1976
1977	574,000	1016	630	5995	750	7155	34,100	60	37	355	44	422	608,100	1,076	667	6,350	794	7,562	1977
1978	582,300	1045	648	6643	770	7925	34,600	62	38	393	45	467	616,900	1,107	686	7,036	815	8,377	1978
1979	590,600	1073	665	7308	791	8716	35,100	63	39	432	47	514	625,700	1,136	704	7,740	838	9,215	1979
1980	598,900	1102	683	7991	812	9528	35,600	65	40	472	48	562	634,500	1,167	723	8,463	860	10,075	1980
1981	607,300	1130	700	8691	832	10,360	36,000	67	41	513	49	611	643,300	1,197	741	9,204	881	10,956	1981
1982	615,600	1159	718	9409	853	11,213	36,500	68	42	555	50	661	652,100	1,227	760	9,964	903	11,859	1982
1983	623,900	1188	736	10,145	874	12,087	37,000	70	43	598	52	713	660,900	1,258	779	10,743	926	12,785	1983
1984	632,200	1216	754	10,899	895	12,982	37,500	72	44	642	53	766	669,700	1,288	798	11,541	948	13,733	1984
1985	640,500	1245	772	11,671	916	13,898	38,200	73	46	688	54	820	678,500	1,318	818	12,359	970	14,703	1985
1986	648,800	1273	789	12,460	937	14,835	38,500	75	47	735	55	875	687,300	1,348	836	13,195	992	15,695	1986
1987	657,100	1302	807	13,267	957	15,792	39,000	77	48	783	56	931	696,100	1,379	855	14,050	1013	16,708	1987
1988	665,400	1331	825	14,092	978	16,770	39,500	78	49	832	58	989	704,900	1,410	874	14,924	1036	17,744	1988
1989	673,800	1359	842	14,934	999	17,769	39,900	80	50	882	59	1048	713,700	1,439	892	15,816	1058	18,802	1989
1990	682,100	1388	860	15,794	1020	18,789	40,400	82	51	933	60	1108	722,500	1,470	911	16,727	1080	19,882	1990
1991	690,400	1416	878	16,672	1040	19,829	41,000	84	52	985	61	1169	731,400	1,500	930	17,657	1101	20,983	1991
1992	698,700	1445	896	17,568	1061	20,890	41,500	85	53	1038	63	1232	740,200	1,530	949	18,606	1124	22,107	1992
1993	707,000	1474	914	18,482	1082	21,972	42,000	87	54	1092	64	1296	749,000	1,561	968	19,574	1146	23,253	1993
1994	715,300	1502	931	19,415	1103	23,075	42,500	89	55	1147	65	1361	757,800	1,591	986	20,562	1168	24,421	1994
1995	723,600	1531	949	20,362	1124	24,199	43,000	90	56	1203	66	1427	766,600	1,621	1005	21,565	1190	25,611	1995

NOTE ALL VOLUMES ARE ADJUSTED FOR SEASONAL VARIATIONS AND COMPACTED
ALL WEIGHTS ARE ADJUSTED FOR SEASONAL VARIATIONS
SEE TABLE II - 24 FOR MEASURED AREA

4. Commercial and Industrial Waste. We have estimated these wastes will increase at a rate which is equal to 5% per year.

5. Special Tree Waste. In the special study of diseased tree waste discussed in Section D, it was estimated that 306,984 elm trees would be removed in the five years after 1968. These trees contained 595,549 tons or 798,158 CY of waste. We have arbitrarily estimated that the annual rate of removal would be equal to 20% of the total each year for 5 years. On that basis for each year from 1968 through 1972, we have included 159,600 cubic yards and 119,100 tons.

6. Total Future Waste Quantities. The total future waste quantities for the Measured Area and Total Study Area, from the year 1968 to 1995, are shown in Table II-24 and Table II-26 respectively.

By 1995 it is estimated that the annual rate of disposal of wastes at public sanitary landfill facilities will be 1,621,000 cubic yards per year, seasonally adjusted and compacted in place; and 1,190,000 tons, seasonally adjusted. The accumulation from 1968 to 1995 is equal to 21,565 acre feet, and 25,611,000 tons.

PART THREE - SOLID WASTE DISPOSAL FACILITIES

A. GENERAL. The disposal of solid waste, as discussed in this part of the report is based on the regional approach. Under this concept the several communities in the Study Area jointly provide solid waste disposal facilities for their mutual use and benefit. The recommended organizational structure and procedures are presented in Part IV of this report. Two of the important principles which support this joint approach are: First, one or more large disposal facilities, regardless of the type, can be operated at a unit cost which is less than that resulting from many small facilities; and second, large facilities and operations can attract and can afford the necessary full time professional management required to operate the disposal facilities properly.

Solid waste disposal can be accomplished using any of several methods, or combination of methods. These are discussed in Section F. 4. of Part I of this report. The selection of the most appropriate method or methods depends on the particular circumstances that prevail at the time and in the location where the disposal is needed. For the reasons explained in I. F. 4. we have recommended that several Public Sanitary Landfill facilities be provided to dispose of most of the solid waste generated in the Study Area.

In addition to material currently being disposed of at public sanitary landfills, many private commercial and industrial establishments currently dispose of their own wastes through the use of a variety of disposal methods. Where these private facilities are properly operated and do not constitute a hazard to public health, a nuisance or result in pollution, they should be permitted to continue.

The Commercial and Industrial Surveys described in Part II, Section B show that more than three-fourths of the tonnage and approximately one half of the total volume of commercial and industrial waste produced was disposed of at private facilities. Some of this material is expected to be diverted to public facilities if more strict requirements are placed on all disposal facilities. Allowance has been made for this diverted material when determining the required size of the public disposal facilities.

Much of the commercial and industrial waste which is currently being disposed of in private facilities consists of inert materials such as slag, dirt, sand and rock, broken concrete, and other inert demolition wastes. The proper disposal of materials of this type does not require the careful handling and expensive covering necessary at a sanitary landfill site. This material can often be used as a fill material to reclaim or improve low land or simply deposited in an inexpensive landfill.

Some commercial and industrial waste is hazardous or difficult to handle at public sanitary landfill sites and must be disposed of by the producer at private facilities. Included in part, in this type of waste are materials such as: contaminated or infectious materials from hospitals; drug, insecticide and herbicide waste; paint manufacturing wastes; highly inflammable or explosive materials; fine powders and others. The producers of these wastes recognize the hazardous nature of their materials and either pretreat them to render them harmless or dispose of them in their own facilities.

Provisions have been made for the licensing and control of private disposal facilities in the recommendations discussed in Part IV of this report.

In the following sections of this Part III, Public Disposal Facilities are analyzed and discussed and recommendations are developed concerning the public disposal facilities needed to handle the current solid wastes and future solid wastes to the year 1995.

B. RECOMMENDED METHOD OF DISPOSAL. The sanitary landfill method is recommended for the following reasons:

1. Land is available.
2. The method has been proven satisfactory where properly operated.
3. The method can meet all health and sanitation requirements, and be aesthetically pleasing.
4. The method is adaptable to varying quantities and peak or slack rates.
5. The method is the most economical.

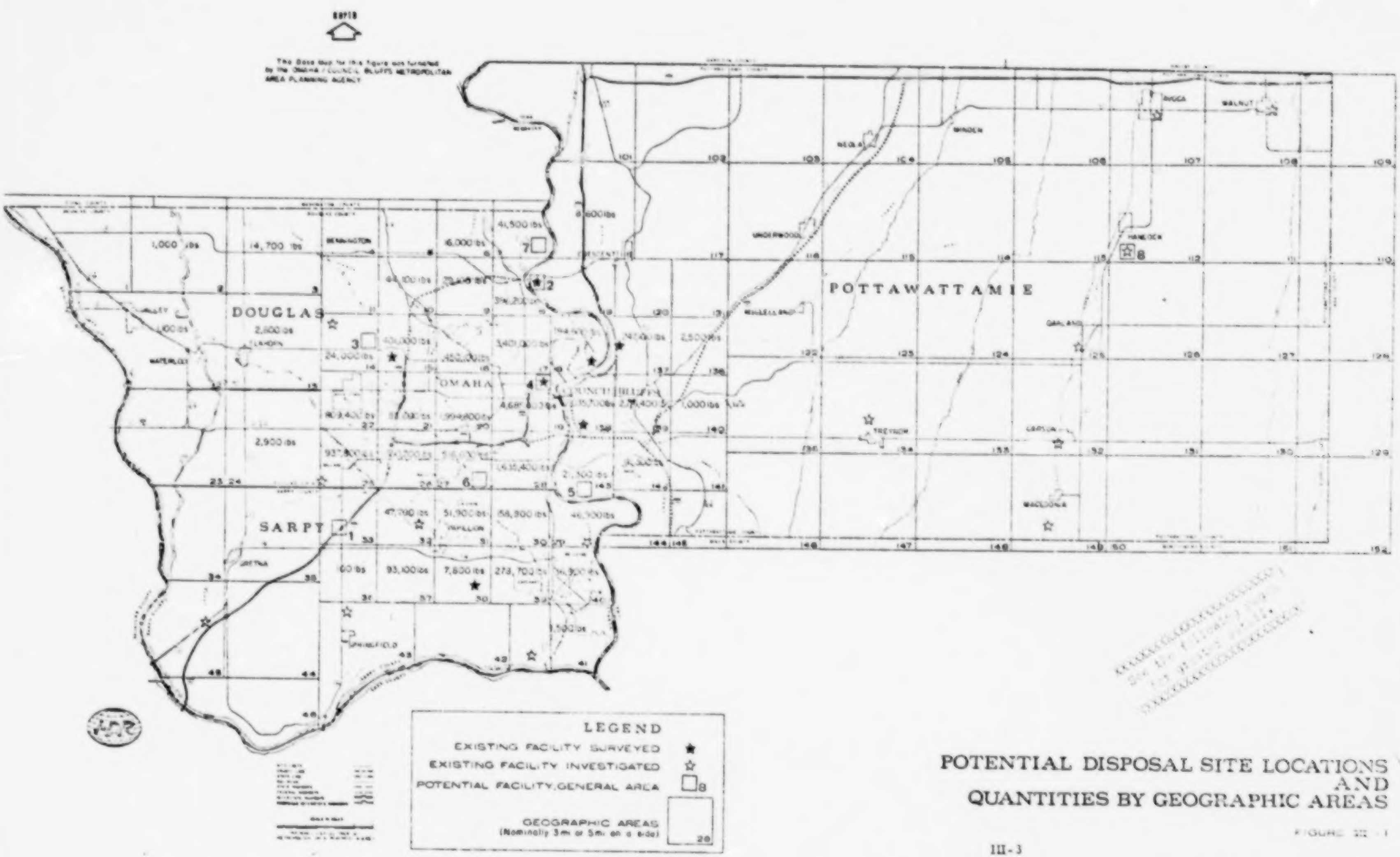
C. SELECTING GENERAL AREAS FOR SOLID WASTE DISPOSAL FACILITIES.

1. General. Eight general areas were considered for potential disposal facilities as shown in Figure III-1. One site could be located in each general area.

The general areas were selected using the following criteria:

a. Minimum driving time and distance to site area.
b. Present land use compatible with sanitary landfilling.
c. Accessibility to major highways or arterial streets.
d. Economical land cost.
e. General topography, including terrain, ground cover, drainage, ground water and major subsurface conditions.
f. Suitable earth cover available.

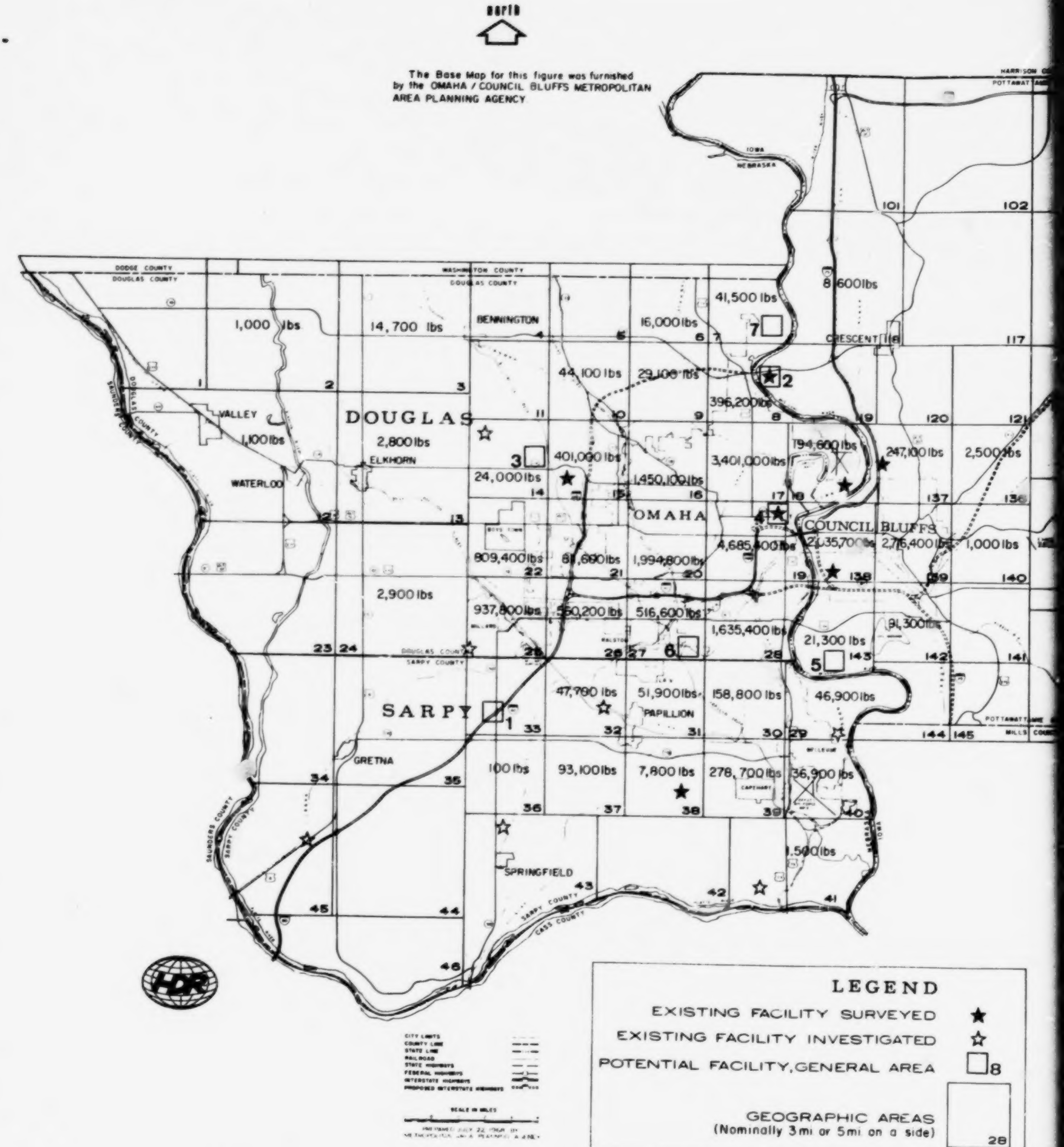
2. Driving Time and Distance. The total cost of solid waste disposal is the sum of the cost to haul the material from the point of origin to the point of disposal, referred to as haul cost, and the cost of


NORTH
DOUGLAS
SARPY
POTTAWATTAMIE
OMAHA
COUNCIL BLUFFS
BENNINGTON
WATERLOO
GRETNA
SPRINGFIELD
PAPILLION
UNDERWOOD
NEOLA
MINDEN
AVOCA
WALNUT
HANCOCK
OAKLAND
TREYNOR
CARSON
MACEDONIA
1,000 lbs
14,700 lbs
6,000 lbs
41,500 lbs
2,600 lbs
24,000 lbs
400,000 lbs
3,401,000 lbs
2,900 lbs
47,700 lbs
51,900 lbs
58,800 lbs
46,300 lbs
93,100 lbs
7,800 lbs
278,700 lbs
2,500 lbs
1,000 lbs
21,500 lbs
1,635,400 lbs
1
2
3
4
5
6
7
8
LEGEND
EXISTING FACILITY SURVEYED ★
EXISTING FACILITY INVESTIGATED ☆
POTENTIAL FACILITY, GENERAL AREA □8
GEOGRAPHIC AREAS (Nominally 3mi or 5mi on a side) □28

The Base Map for this figure was furnished by the OMAHA / COUNCIL BLUFFS METROPOLITAN AREA PLANNING AGENCY

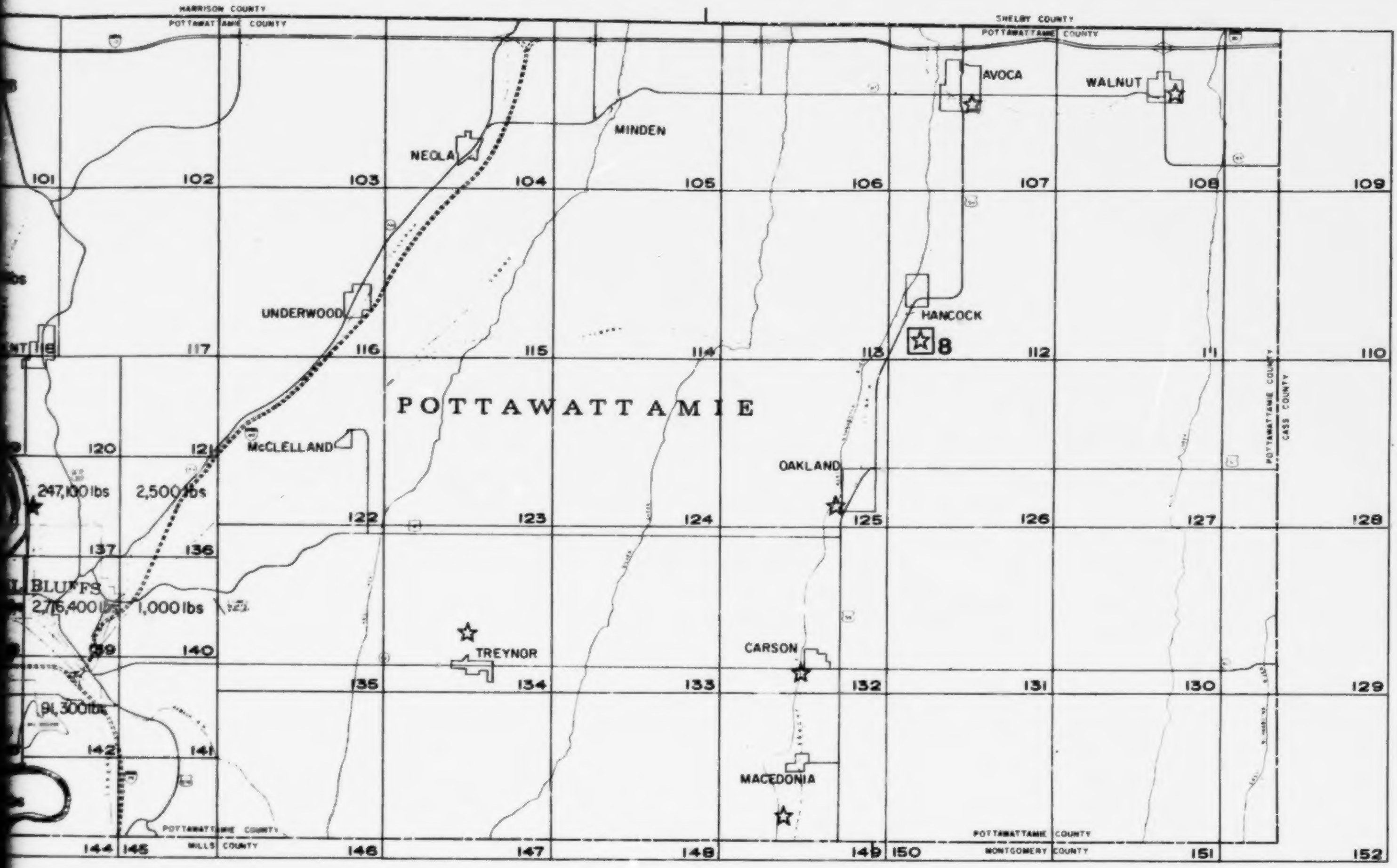
POTENTIAL DISPOSAL SITE LOCATIONS AND QUANTITIES BY GEOGRAPHIC AREAS

FIGURE III-1



The Base Map for this figure was furnished by the OMAHA / COUNCIL BLUFFS METROPOLITAN AREA PLANNING AGENCY

north
DOUGLAS
SARPY
OMAHA
COUNCIL BLUFFS
VALLEY
WATERLOO
ELKHORN
BENNINGTON
CRESCENT
PAPILLION
GRETNA
SPRINGFIELD
DODGE COUNTY
DOUGLAS COUNTY
WASHINGTON COUNTY
SAUNDERS COUNTY
SARPY COUNTY
CASS COUNTY
IOWA
NEBRASKA
1,000 lbs
14,700 lbs
16,000 lbs
41,500 lbs
8,600 lbs
44,100 lbs
29,100 lbs
396,200 lbs
1,100 lbs
2,800 lbs
401,000 lbs
24,000 lbs
3,401,000 lbs
194,600 lbs
247,100 lbs
2,500 lbs
1,450,100 lbs
2,135,700 lbs
2,716,400 lbs
1,000 lbs
809,400 lbs
81,680 lbs
1,994,800 lbs
4,685,400 lbs
2,900 lbs
937,800 lbs
550,200 lbs
516,600 lbs
1,635,400 lbs
21,300 lbs
91,300 lbs
47,780 lbs
51,900 lbs
158,800 lbs
46,900 lbs
100 lbs
93,100 lbs
7,800 lbs
278,700 lbs
36,900 lbs
1,500 lbs
LEGEND
EXISTING FACILITY SURVEYED ★
EXISTING FACILITY INVESTIGATED ☆
POTENTIAL FACILITY, GENERAL AREA ☐8
GEOGRAPHIC AREAS (Nominally 3mi or 5mi on a side) 28
HDR


HARRISON COUNTY
POTTAWATTAMIE COUNTY
SHELBY COUNTY
POTTAWATTAMIE COUNTY
AVOCA
WALNUT
NEOLA
MINDEN
101
102
103
104
105
106
107
108
109
UNDERWOOD
HANCOCK
8
117
116
115
114
113
112
111
110
POTTAWATTAMIE
POTTAWATTAMIE COUNTY
CASS COUNTY
120
121
McCLELLAND
OAKLAND
247,100 lbs
2,500 lbs
122
123
124
125
126
127
128
137
136
BLUFFS
2,716,400 lbs
1,000 lbs
TREYNOR
139
140
CARSON
135
134
133
132
131
130
129
91,300 lbs
142
141
MACEDONIA
POTTAWATTAMIE COUNTY
MILLS COUNTY
POTTAWATTAMIE COUNTY
MONTGOMERY COUNTY
144
145
146
147
148
149
150
151
152

GEND
RVEYED ★
TIGATED ☆
L AREA ☐8
AREAS
on a side) 28

POTENTIAL DISPOSAL SITE LOCATIONS
AND
QUANTITIES BY GEOGRAPHIC AREAS

FIGURE III - 1

owning and operating the disposal facility, referred to as disposal fee.

To minimize haul cost, driving time and distance from the origin of the solid waste to the disposal facility must be restricted to minimum values compatible with other selection criteria.

The eight general areas selected for this study are conveniently located and provide short driving distances and times for the haulers in the areas they would serve.

3. Land Use. Sanitary landfilling is not in itself objectionable but it must be considered as an industrial activity, and as such, its location should be based upon this concept. The eight sites considered in this study are located in undeveloped agricultural areas, or in industrially zoned areas.

4. Accessibility. An area accessible from highways and major arterial streets is necessary for three primary reasons:

a. The haulers of solid waste material need heavy duty roads to transport the loads without damaging the road structures.

b. Major streets reduce driving time and haul cost.

c. The additional vehicular traffic generated by a landfill facility is of no consequence to the normal flow of traffic on major streets which carry thousands of vehicles per day, but it would be a nuisance if routed over local streets which carry only a few hundred vehicles per day. The areas considered in this study with one exception (Site 6) are adjacent to either highway or major arterials and the four sites recommended for the metropolitan area are now or will be readily accessible from the Interstate Highway System.

5. Land Cost. Land costs should not influence the overall selection process to the extent that other selection criteria are sacrificed. The most economical piece of property that satisfies all selection criteria should be selected. Fortunately, costs of land in the areas considered for this study were not prohibitive, and when amortized over twenty years, represent only about 10% of the total annual cost.

6. General Topography. The topography of a landfill area should be such that it is not detrimental to landfilling operations, nor should the landfill create water pollution problems. Terrain, ground cover, surface drainage, ground water, and subsurface conditions should be analyzed to make certain the site can be developed and used for filling without undue expense and without potential water pollution. Waste material should not be placed in ground which could be flooded from surface drainage or saturated by a high ground water table. Further, the site should be compatible with heavy earth moving operations since landfilling is much like major earth moving jobs.

The desirable topographic features mentioned for landfill areas do not apply to transfer stations such as the one considered in this study at Site 4. A transfer station is a building structure which must be aesthetically pleasing and compatible with its surroundings as discussed in Section D. 1.

The eight locations considered in this study have no known features which would be detrimental or incompatible with solid waste disposal operations.

7. Earth for Cover Material. After solid waste material is deposited at a sanitary landfill site, it is spread, compacted, and covered with a layer of earth. Usually, several layers of waste are placed one on top of another until the land is brought up to the desired elevation. Finally, a layer of earth several feet thick, is placed over the entire filled area.

A large portion of the cost of a sanitary landfill operation is the movement and placement of earth cover. This cover material must be suitable in quality and adequate in quantity for a proper and economical site operation. Except for Site 6, the landfill areas considered in this study have abundant quantities of earth suitable for cover material. Cover material is not required at a transfer station.

D. SELECTION OF PROPOSED FACILITIES.

1. Transfer Stations. The primary function of a solid waste transfer station is to provide for the economical transfer of solid waste from some central location convenient for waste haulers to a relatively remote sanitary landfill site. The transfer of the solid waste is effected by packing the refuse of many individual haulers into a large transfer trailer which is then pulled to the landfill site, emptied, and returned to the transfer station.

Following is a discussion of the location, design, capacity, cost, and economics of transfer stations in relation to solid waste handling requirements for the Metropolitan portion of this Study Area. It becomes apparent that most haulers would find it more economical to haul directly to a sanitary landfill site than to pay the additional fee which would be charged for transfer service.

a. Location of Transfer Stations. Transfer stations must be located so as to satisfy the two general criteria of convenience and economy for haulers and compatibility with adjacent land use.

(1) Convenience and economy as applied to transfer stations are interdependent and in many ways synonomous. If it is more economical for a hauler to use a transfer station rather than a sanitary landfill site, then the transfer station is conveniently located.

The most economical location for a transfer station from the hauler's viewpoint would be at the centroid of solid waste generation, provided that location is readily accessible from major streets. Haul distances would be short but haul time is also a cost consideration. If short hauls require relatively long haul times, then a location may not be economical because of its adverse accessibility. For a transfer station to be economical to haulers, it must be less expensive for a hauler to transfer waste to the transfer station and pay a transfer fee plus a disposal fee, then to haul directly to a sanitary landfill site and pay only a disposal fee.

A transfer station could also be inconvenient and uneconomical if a hauler incurred delay and expense, within the confines of the station, due to inadequate facilities or improper design of the facilities.

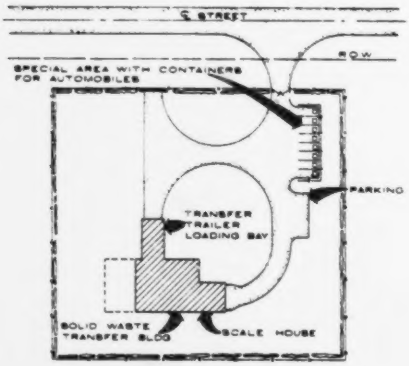
Two locations were considered in this study for transfer stations. One station site at 108th and Maple, the present location of the Douglas County Sanitary Landfill site, was selected because of its strategic location in West Omaha with good access to the Interstate Highway and because there was an existing solid waste disposal facility operating. It was assumed that the transfer station would go into operation when the present sanitary landfill site was filled and closed. The second station site was at 6th and Seward Streets in Omaha, the location of the Municipal Incinerator which has now been converted to a city-operated transfer station. This site was selected because of its location in an industrially zoned area where large quantities of waste are generated.

Both transfer site locations were considered with a variety of combinations of other facilities using economic simulations which are described in Paragraphs 1.e. and 2 of this Section D. They were found to be uneconomical. Subsequent investigations showed that no location would be economical when there were sanitary landfill sites proposed within a reasonable direct hauling distance.

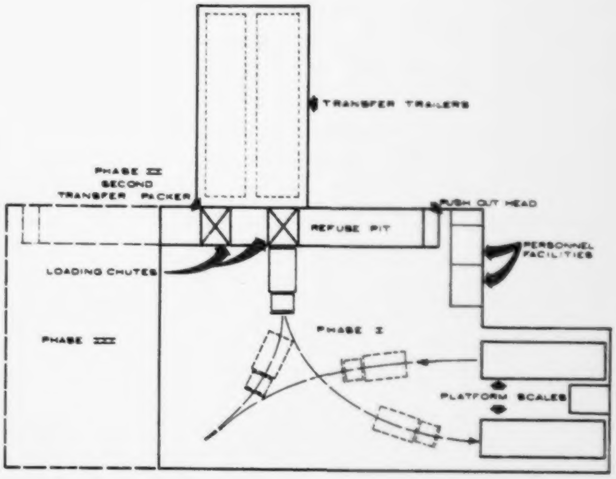
(2) Activities at a solid waste transfer station are industrial in nature. As such, these activities should be conducted in an area where they are compatible with those in the surrounding area, and the transfer station buildings and grounds should be aesthetically pleasing in order to be acceptable to the public. A transfer site should be located in an area where the amount of vehicular traffic and traffic patterns generated by a transfer station will not place a burden upon streets meant for light duty use.

b. Design of Transfer Stations. The preliminary design of a transfer station includes site planning, building arrangement, and transfer capacity. A preliminary site plan and building arrangement is shown in Figure III-2.

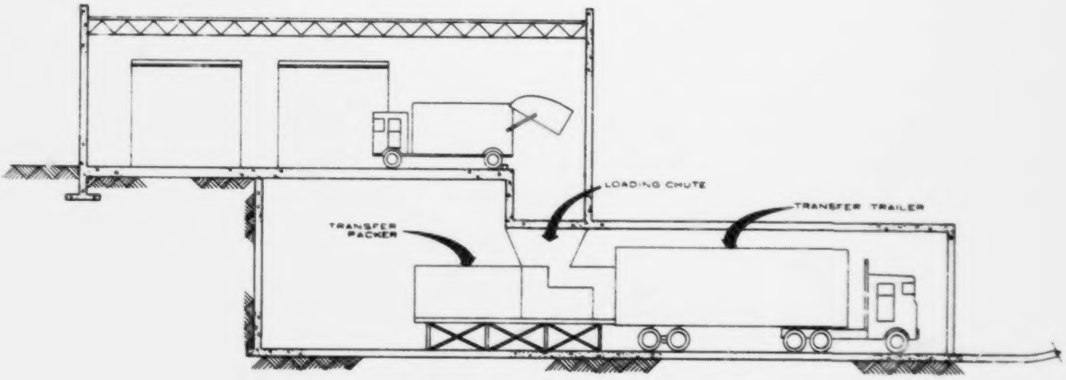
(1) The site planning consists of determining land requirements, landscaping, set-backs and site screening requirements, and determining pavement geometry and grades to serve the 2-level transfer structure.


℄ STREET
ROW
SPECIAL AREA WITH CONTAINERS FOR AUTOMOBILES
PARKING
TRANSFER TRAILER LOADING BAY
SOLID WASTE TRANSFER BLDG
SCALE HOUSE

SITE PLAN


TRANSFER TRAILERS
PHASE II SECOND TRANSFER PACKER
PUSH OUT HEAD
REFUSE PIT
PERSONNEL FACILITIES
LOADING CHUTES
PHASE III
PHASE I
PLATFORM SCALES

FLOOR PLAN


LOADING CHUTE
TRANSFER TRAILER
TRANSFER PACKER

ELEVATION

TRANSFER STATION

FIGURE III-2

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best available copy.

(2) The building arrangement is made to provide for the efficient flow of traffic within the building and transfer of solid waste from incoming vehicles to the transfer trailer.

(3) The capacity of a transfer station involves the two elements of vehicle capacity and refuse transfer capacity.

Vehicle capacity refers to the ability of the station to handle the number of vehicles arriving and leaving during the station's peak time of use. This capacity is provided by proper design of traffic patterns; by providing for an adequate number of unloading stalls, and by providing for a vehicle weighing system which will perform its function efficiently and without delays. Traffic flow would be improved by eliminating from that flow the relatively large number of automobiles that would use a transfer station. This is accomplished by providing special facilities for automobiles as seen in Figure III-2. The required number of unloading stalls within the transfer structure and the adequacy of a particular weighing system are determined by computation utilizing the survey quantity and vehicular data shown in Figures II-9 through II-22, and the computer printout for the economic site simulations.

The transfer capacity of a transfer station is determined by the capacity of its least efficient element. Assuming that the vehicle capacity of the station is adequate, then the transfer capacity may be limited by the storage capacity, the stationary packer system, the labor force, or the number of transfer vehicles available. These elements must all be examined separately and in total in order to provide capacities compatible with the projected use of the facility.

c. Cost of Transfer. If a transfer station is to be self-supporting, a transfer fee must be established that will provide enough revenue to cover the total annual cost of the station. The cost shown in Table III-1 and the following paragraph d. is for the Phase I construction and operation of a transfer station at Site No. 4, which was the most economical station considered. In this example refuse is transferred to Site No 5, which is the nearest and most economical site for transfer from Site No. 4.

d. Annual Cost. It has been assumed in the cost estimate that the transfer station will operate 6 days per week. It is further assumed that the station will transfer 420 tons of refuse per day or 131,000 tons per year. To determine a transfer fee it is necessary to convert all costs to dollars per ton. These costs include the annual costs of the station operation, annual costs of rolling equipment, running costs of rolling equipment, and truck driver costs.

1. Annual Costs - Transfer Station Operation

   a. Construction costs, amortized over 20 years @ 6%
   .0872 x 141,000 = $12,300

   b. Stationary equipment costs amortized over 10 years @ 6%
   .1358 x 77,000 = $10,400

c.	The interest on land @ 6% .06 x 22,000 =	$ 1,300	
d.	Labor costs assumed constant	$31,650	
e.	Miscellaneous costs and utility costs	$10,000	
f.	Annual Costs, Transfer Station Operation		$65,650

2. Annual Costs - Rolling Equipment

Amortization + Interest	$16,800

3. The running costs of the rolling equipment have been determined in the estimate to be 24¢ per mile. The round trip distance from the transfer station at Site 4 to Site 5 is 12 miles.

4. Truck drivers are assumed to receive $3.40 per hour and will transfer refuse at the rate of 20 tons per trip with each trip requiring 45 minutes.

5. The transfer fee is determined as follows:

a.	Station Operation $65,650/Yr. ÷ 131,000 Ton/Yr. =	50.2¢/Ton
b.	Rolling Equipment $16,800/Yr. ÷ 131,000 Ton/Yr. =	12.8¢/Ton
c.	Running Costs 24¢/Mi x 12 Mi/Trip ÷ 20 Tons/Trip =	14.4¢/Ton
d.	Driver Costs $3.40/Hr. x $\frac{45}{60}$ Hr/Trip ÷ 20 Ton/Trip =	12.8¢/Ton
e.	Overhead and Contingencies @ 20% =	17.8¢/Ton
f.	Total Transfer Cost =	$1.08/Ton

e. Transfer Station Economics. The transfer fee of $1.08 per ton was used in the site simulations to determine if the transfer station would receive the refuse needed to produce the revenue required to make the station self-supporting. Site simulations are further explained and discussed in the following Paragraph D.2.

The simulations were done by computer program. Briefly, computer inputs were unit costs, haul times and distances. The computer print-out showed total costs and site use.

TABLE III-1. TRANSFER STATION - BASIC DATA FOR COST ESTIMATE

A.	PHASE I - STRUCTURE & SITE DEVELOPMENT				
	1.		Main Structure	$39,000	
	2.		Lower Structure	27,200	
	3.		Overhead Doors	4,800	
	4.		Mechanical & Electrical	12,000	
	5.		Excavation & Backfill	2,000	
			Sub-Total Construction		$85,000
	6.		Initial Site Development		
		a.	Utilities	5,000	
		b.	Fencing	5,000	
		c.	Grading	2,000	
		d.	Landscaping	3,000	
		e.	Paving	15,300	
		f.	Area Lighting	2,000	
			Sub-Total Site Development		$32,300
	7.		Overhead & Contingencies		23,700
	8.		Total Cost Construction & Site Development		$141,000
B.	STATIONARY EQUIPMENT COSTS				
	1.		Packer System	$30,000	
	2.		Scale System	34,000	
	3.		O.H. & Contingencies	13,000	
	4.		Total Cost - Stationary Equipment		$77,000
C.	LAND COSTS				
	1.		4.6 Ac @ $4,000/Ac.	$18.400	
	2.		O.H. & Contingencies	3,600	
	3.		Total Cost - Land		$22,000
D.	TRANSFER STATION LABOR COSTS				
	1.		3 Men (40 Hr. Wk.)@$6,000/Yr.	$18,000	
	2.		Fringe Benefits + 17%	+ 3,100	
	3.		Subtotal	21,100	
	4.		60 Hr. Wk., Increase 50%	+ 10,550	
			Total Labor Costs		$31,650
E.	ROLLING EQUIPMENT COSTS				
	1.		Tractors		
		a.	2 Tractors w/o Tires	$28,000	
		b.	20 Tires	2,400	
		c.	Subtotal	30.400	
		d.	Salvage (6 Yrs.)	- 6,100	
		e.	Subtotal	24,300	
		f.	Amortization, 6 yr. @ 6% (.203) =	4,940	
		g.	Interest on Salvage 6%	360	
			Annual Amortization + Interest		$ 5,300

TABLE III-1. TRANSFER STATION - BASIC DATA FOR COST ESTIMATE (Cont'd)

E.	ROLLING EQUIPMENT COSTS (Cont'd)				
	2.	Transfer Trailers			
		a.	3 Trailers w/o Tires	$63,000	
		b.	24 Tires	2,880	
		c.	Subtotal	$65,880	
		d.	Salvage (6 yr.)	- 13,180	
		e.	Subtotal	$52,700	
		f.	Amortization, 6 yr. @ 6% (.203)	10,700	
		g.	Interest on Salvage	800	
			Annual Amortization + Interest		$11,500
	3.	Total Annual Amortization + Interest, Rolling Equipment			$16,800
F.	RUNNING COSTS - ROLLING EQUIPMENT				
	1.	Tires			
		a.	Tractors $2,400 ÷ 30,000 Mi. =	0.08/Mi.	
		b.	Trailers $2,880 ÷ 60,000 Mi. =	0.05/Mi.	
	2.	Fuel			
			$0.15/Gal. @ 5 mpg =	0.03/Mi.	
	3.	Maintenance and Repair			
		a.	Tractor	0.03/Mi.	
		b.	Trailer	0.02/Mi.	
	4.	Total Running Costs			
		a.	Tractor		
			Tires	0.08/Mi.	
			Fuel	0.03/Mi.	
			M&R	0.03/Mi.	
		b.	Trailer		
			Tires	0.05/Mi.	
			M&R	0.02/Mi.	
		c.	Tire Hazard	0.03/Mi.	
				$0.24/Mi.	
G.	TRUCK DRIVER COST				
	1	Time per round trip		45 Min.	
	2.	Tons per round trip		20 Tons	
	3.	Rate per hour		$3.40	

The 6 simulations which included the transfer station at Site 4 are reproduced in Table III-2. Included in the disposal fee in the first five simulations is the transfer fee of $1.08 per ton. The quantity of refuse received at the transfer station in these 5 simulations varies from 655 tons/week to 786 tons/week. For a 6-day work week this represents from 109 to 131 tons per day which is well below the 420 tons per day necessary to make the station self supporting.

In the 6th simulation, the transfer fee was eliminated to determine what quantities the station would receive if it were free. In that situation, refuse at the rate of 6130 tons/week or 1020 tons/day would arrive at the transfer station. The subsidy required to transfer this refuse is approximately $1.08 x 6130 = $6,620 per week. This cost was included in the "Disposal Cost" and "Total Community Cost" in the Table in order to determine actual costs and properly rank the simulation.

It was apparent that the transfer station was not economically feasible even under what were considered to be minimum design standards and operating conditions. A higher fee would further reduce the refuse and revenue received, and a fee set low enough to make the transfer station economically attractive to its users would require subsidy. A station designed to lower standards is not recommended.

The primary cause of the adverse economics of transfer stations in this Metropolitan Area is the short direct haul to relatively close sanitary landfill facilities.

2. Economic Simulations of Potential Sanitary Landfill Sites.

a. General. The purpose of the economic site simulations was to aid in the selection of one or more sanitary landfill sites from the 7 potential sites considered in the Metropolitan area. The simulations were accomplished with the aid of a computer program which used waste quantities, site location, and cost data input to compare the economics of various combinations of the 7 potential sites.

The 7 potential site locations shown in Figure III-1 are described as to their general location and numbered for simulation purposes as follows:

Site 1	Vicinity of I-80 & Hwy. 50, Sarpy Co.
Site 2	Existing landfill east of the Mormon Bridge Pottawattamie Co.
Site 3	Vicinity of 120th & Fort Streets, Douglas Co.
Site 4	Omaha incinerator/transfer station
Site 5	West of Lake Manawa, Pottawattamie Co.
Site 6	Vicinity of 60th & Harrison, Douglas Co.
Site 7	North of Dodge Park, Douglas Co.

TABLE III - 2
Excerpt of Table III - 3

ECONOMIC SITE SIMULATIONS
(RANKED IN ASCENDING ORDER
OF "TOTAL COMMUNITY COST")

SITE	LOCATION (SEE FIGURE III-2)
1.	I-80 & HWY. 50, SARPY CO., NEBR.
2.	E OF MORMON BRIDGE, POTTAWATTAMIE CO., IOWA
3.	120TH & MAPLE, DOUGLAS CO., NEBR.
4.	OMAHA CITY TRANSFER STATION, DOUGLAS CO., NEBR.
5.	W OF LAKE MANAWA, POTTAWATTAMIE CO., IOWA
6.	60TH & HARRISON, DOUGLAS CO., NEBR.
7.	N OF DODGE PARK, DOUGLAS CO., NEBR.

*WEEKLY QUANTITIES ADJUSTED FOR COMPACTION AND/OR SEASONAL VARIATIONS

RANK	SIMULATION NUMBER	SITES	DISPOSAL FEE $/TON	C.Y.*	% C.Y.	TONS*	% TONS	HAUL COST	DISPOSAL COST	TOTAL COMMUNITY COST
1.	61	2 3 4 5	1.25 1.25 2.33 1.25	2576 3743 1143 5858	19.34% 28.10% (8.58%) 52.56%	1949 3061 655 4523	19.13% 30.05% (6.43%) 50.82%	2423.- 3440.- 1451.- 6503.- 13817.-	2439.- 3842.- 1491.- 5665.- 13437.-	$27,254.-
2.	100	1 3 4 5 7	1.25 1.25 2.33 1.25 1.25	815 2956 1306 5960 2283	6.12% 22.19% (9.80%) 54.54% 17.14%	702 2380 769 4608 1729	6.89% 23.36% (7.55%) 52.78% 16.97%	766.- 2523.- 2091.- 6786.- 1700.- 13866.-	882.- 2988.- 1743.- 5779.- 2164.- 13556.-	$27,422.-
3.	99	3 4 5 7	1.25 2.33 1.25 1.25	3765 1307 5965 2283	28.27% (9.81%) 54.59% 17.14%	3078 770 4611 1729	30.21% 7.56% 52.82% 16.97%	3491.- 2112.- 6801.- 1700.- 14104.-	3862.- 1745.- 5784.- 2164.- 13555.-	$27,659.-
4.	97	1 3 4 5	1.25 1.25 2.33 1.25	815 5220 1325 5960	6.12% 39.19% (9.95%) 54.69%	702 4092 786 4608	6.89% 40.17% (7.71%) 52.94%	766.- 4504.- 2165.- 6786.- 14221.-	882.- 5129.- 1782.- 5779.- 13572.-	$27,793.-
8.	60	3 4 5	1.25 2.33 1.25	6029 1326 5965	45.26% (9.95%) 54.73%	4791 786 4611	47.02% (7.72%) 52.98%	5472.- 2186.- 6801.- 14459.-	6004.- 1784.- 5784.- 13572.-	$28.031.-
18.	48	1 2 3 4 5	1.25 1.25 1.25 1.25 1.25	815 385 2916 6130 3074	6.12% 2.89% 21.89% (46.02%) 69.10%	702 302 2360 4557 2267	6.89% 2.97% 23.16% (44.73%) 66.98%	766.- 748.- 2462.- 3797.- 3739.- 11512.-	862.- 380.- 2964.- 10638.- 2843.- 17707.-	$29.219.-

General site locations were selected and examined if they appeared to be convenient for large numbers of people now and in the future. If it was found that a location satisfied the selection criteria of convenience, accessibility, zoning, economy, general topography, and cover dirt availability, it was used in the site sumulations.

It is not practical for even a large computer to develop all the possibilities inherent to this type of simulation and for this reason certain assumptions were made and limitations set. The simulations were purely economic. It was assumed that each hauler prefers to dispose of his refuse in the least costly manner by taking the quickest route to the landfill, that he, in fact, knows the quickest route, and that he intends to make a direct round trip for the sole purpose of disposing of the refuse. It was judged that fewer than two landfill sites would not satisfy community needs and that more than five sites would not be feasible. Also, it was obvious by inspection of the map (Figure III-1) showing the potential site locations, that certain site combinations were not reasonable. These practical considerations eliminated most of the several hundred theoretical site combinations resulting from the seven potential sites and made the simulation process a manageable and very useful tool.

b. Computer Input. Quantity input data were obtained from the landfill surveys described in Part II. The particular program used in the site simulation process was Program D, shown in Table II-12, which gives total quantities for all facilities in terms of type of vehicle by geographic area. Specifically, the program supplied waste quantities in tons and cubic yards, types and numbers of vehicles hauling these quantities, and the geographic areas from which the waste was hauled. This program supplied other useful information but was primarily designed to supply the data required for the site simulation process.

Computer input for each site location was the haul time and distance from the center of each geographic area, to each potential landfill site. Distances were determined from maps and times were computed on the basis of 4 minutes per mile (15 mph) for local streets, 2.4 minutes per mile (25 mph) for arterial streets, and 1.2 minutes per mile (50 mph) for highways. Where there was a choice of routes by either, the shortest time or shortest distance, the shortest time was selected.

Cost data input included disposal fees, transfer fees, toll bridge fees, and unit haul costs. With prior knowledge of landfill costs in this and other areas, disposal fees were set at $1.25 per ton for publicly operated sites and at $1.80 per ton for privately operated sites. These fees were assumed to provide for the cost of all labor, equipment, management, and site development incidental to a properly operated sanitary landfill. In addition to the set disposal fee, a minimum fee of $1.00 was established for all vehicles except automobiles and station wagons which would be permitted to use the facilities free of charge.

When transfer stations were considered in the simulations the transfer fee was added to and considered part of the disposal fee. Transfer fees were determined by computation and were discussed in the portion of this report pertaining to Transfer Stations. Round trip toll fees were included for those vehicles using the Mormon Bridge and varied from \$0.70 for automobiles to \$2.00 for heavy trailers. Unit haul costs consisted of vehicle running cost per mile and vehicle operating cost per minute. Running cost per mile included fuel, oil, tires, and maintenance. This cost varied from 6¢ per mile for automobiles to 24¢ per mile for transfer vehicles. Operating cost per minute included wages, amortization, interest, and insurance. This cost varied from 6.5¢ per minute for automobiles to 14.7¢ per minute for transfer vehicles. The simulation program multiplied these unit haul costs for each vehicle by the distance and time from the geometric center of each geographic area to each site, and then determined minimum total cost of hauling and disposing of waste for each vehicle.

In simulations which included Site 4, it was always considered to be a Transfer Station. Sites 2 and 6 were the only sites considered for both public or private operation. Site 2 is now a privately operated sanitary landfill and Site 6 is presently being considered for operation by private interests. The other 5 sites were considered for public operation only.

It was assumed for simulation purposes that any number of sites could be operated for the fees used in the simulations. This, of course, is not true and adjustments were made after the simulations indicated which combinations of sites should be considered for further comparison and after the cost estimates were developed.

c. Computer Output. Approximately one hundred simulated site combinations were processed. Table III-3 shows the results of 28 key simulations ranked in ascending order of "Total Community Cost" per week. All quantities and costs are for an average week; that is, the measured quantities of solid waste were seasonally adjusted to reflect average weekly quantities. The cost of hauling the solid waste generated during an average week and the cost of disposing of that waste by sanitary landfilling make up the "Total Community Cost."

In most of the simulations, haul cost and disposal cost are approximately equal in magnitude - making each a significant part of the total cost. Adverse haul conditions and/or a higher disposal fee would necessarily make a particular simulation rank higher than otherwise. For example, when only 2 facilities are simulated, many haulers must travel long distances and haul costs increase significantly as seen in Simulation No. 92, Rank No. 17. Also compare the simulations ranked 5 and 10 which contain the same four sites. Simulation No. 52, Rank No. 5, has Sites 1, 2, 3 and 5 with equal disposal fees of \$1.25 per

TABLE III-3 ECONOMIC SITE SIMULATIONS

(RANKED IN ASCENDING ORDER
OF "TOTAL COMMUNITY COST")

SITE	LOCATION (SEE TABLE III-3)
1	I-80 & HWY 50 SARPY CO. NEBR.
2	E OF MORMON BRIDGE, POTTAWATTAMIE CO., IOWA
3	120TH & MAPLE, DOUGLAS CO. NEBR.
4	OMAHA CITY TRANSFER STATION, DOUGLAS CO. NEBR.
5	W OF LAKE MANAWA, POTTAWATTAMIE CO. IOWA
6	40TH & HARRISON, DOUGLAS CO. NEBR.
7	N OF DODGE PARK, DOUGLAS CO. NEBR.

* WEEKLY QUANTITIES ADJUSTED FOR COMPACTION AND / OR SEASONAL VARIATIONS

RANK	SIMULATION NUMBER	SITES	DISPOSAL FEE $/TON	C.Y.*	% C.Y.	TONS*	% TONS	HAUL COST	DISPOSAL COST	TOTAL COMMUNITY COST
1.	61	2 3 4 5	1.25 1.25 2.33 1.25	2570 3743 1163 5858	19.39% 28.10% 52.56%	1940 2861 695 4533	19.13% 30.09% (6.63%) 50.80%	2423.- 3940.- 1651.- 6503.- 13817.-	2430.- 3842.- 1981.- 5665.- 13437.-	$ 27,254.-
2.	100	1 3 4 5 7	1.25 1.25 2.33 1.25 1.25	815 2956 1284 5868 2283	6.12% 22.19% (9.60%) 54.54% 17.16%	702 2380 780 4688 1729	6.80% 23.30% (7.54%) 52.78% 16.87%	766.- 2523.- 2861.- 6788.- 1706.- 13895.-	882.- 2880.- 1765.- 5779.- 2164.- 13556.-	$ 27,422.-
3.	80	3 4 5 7	1.25 2.33 1.25 1.25	3765 1307 5865 2283	28.27% (9.81%) 54.58% 17.16%	3078 770 4811 1729	30.21% 7.56% 52.02% 16.97%	3481.- 2112.- 6801.- 1706.- 14106.-	3842.- 1765.- 5706.- 2185.- 13555.-	$ 27,890.-
4.	97	1 3 4 5	1.25 1.25 2.33 1.25	815 5228 1325 5868	6.12% 39.19% (9.95%) 54.60%	702 4092 786 4688	6.80% 40.17% (7.71%) 52.94%	766.- 6504.- 2165.- 6786.- 14221.-	882.- 5128.- 1782.- 5778.- 13572.-	$ 27,793.-
5.	52	1 2 3 5	1.25 1.25 1.25 1.25	815 2580 2934 6991	6.12% 19.37% 22.03% 52.48%	702 1951 2303 5172	6.89% 19.15% 23.10% 50.77%	766.- 2474.- 2473.- 8913.- 15126.-	882.- 2443.- 2868.- 6482.- 12780.-	$ 27,912.-
6.	60	3 4 5	1.25 2.33 1.25	6030 1328 5865	45.26% (9.95%) 54.73%	4791 786 4811	47.02% (7.72%) 52.90%	5472.- 2186.- 6801.- 14459.-	6061.- 1796.- 5733.- 13572.-	$ 28,031.-
7.	88	3 5 6 7	1.25 1.25 1.25 1.25	2104 4556 4219 2430	15.80% 34.22% 31.67% 18.31%	1787 3654 2907 1840	17.54% 35.86% 28.54% 18.06%	1979.- 7350.- 3822.- 2181.- 15380.-	2246.- 4504.- 3643.- 2303.- 12786.-	$ 28,126.-
8.	53	2 3 5	1.25 1.25 1.75	2580 3744 6996	19.37% 28.11% 52.52%	1951 3062 5175	19.15% 30.05 50.80%	2474.- 3455.- 9475.- 15384.-	2443.- 3844.- 6480.- 12766.-	$ 28,150.-
9.	58	1 3 5 7	1.25 1.25 1.25 1.25	815 2956 7110 2430	6.12% 22.19% 53.38% 18.31%	702 2380 5267 1840	6.80% 23.30% 51.70% 18.06	766.- 2523.- 10193.- 2181.- 15613.-	882.- 2980.- 6613.- 2303.- 12786.-	$ 28,399.-
10.	62	1 2 3 5	1.25 1.80 1.25 1.25	815 456 5001 7048	6.12% 3.42% 37.55% 52.91%	702 335 3826 5225	6.89% 3.29% 38.54% 51.28%	766.- 1071 6148.- 9907.- 15482.-	882.- 501.- 4827.- 6530.- 12854.-	$ 28,436.-
11.	89	3 5 6 7	1.25 1.25 1.80 1.25	3482 7046 244 2430	26.07% 52.80% 1.85% 18.31%	3000 5219 190 1840	29.36% 51.23% 1.37% 18.06%	3118.- 9877.- 405.- 2181.- 15581.-	3740.- 6551.- 253.- 2303.- 12856.-	$ 28,437.-
12.	90	3 5 6	1.25 1.25 1.25	2340 4550 6413	17.60% 34.22% 48.15%	1979 3654 4556	19.42% 35.86% 44.72%	2415.- 7390.- 5925.- 15730.-	2487.- 4504.- 5704.- 12766.-	$ 28,495.-
13.	87	3 5 7	1.25 1.25 1.25	3764 7115 2430	28.27% 53.42% 18.31%	3078 5270 1840	30.22% 51.73% 18.06%	3506.- 10165.- 2181.- 15852.-	3843.- 6620.- 2303.- 12766.-	$ 28,630.-
14.	63	2 3 5	1.80 1.25 1.25	456 5811 7053	3.42% 43.63% 52.95%	335 4625 5228	3.29% 45.40% 51.32%	1071.- 5131.- 9519.- 15721.-	501.- 5780.- 6565.- 12854.	$ 28,675.-
15.	65	1 3 5	1.25 1.25 1.25	815 5395 7110	6.12% 40.50% 53.38%	702 4219 5267	6.89% 41.41% 51.70%	766.- 5103.- 10193.- 16012.-	882.- 5281.- 6613.- 12786.-	$ 28,798.-
16.	91	3 5 6	1.25 1.25 1.80	6028 7043 248	45.26% 52.88% 1.87%	4827 5219 142	47.38% 51.23% 1.39%	5647.- 9877.- 435.- 15979.-	6048.- 6551.- 256.- 12855.-	$ 28,834.-
17.	92	3 5	1.25 1.25	6205 7115	46.58% 53.42%	4918 5270	48.27% 51.73%	6085.- 7165.- 16250.-	6186.- 6620.- 12786.-	$ 29,036.-
18.	48	1 2 3 4 5	1.25 1.25 1.25 1.25 1.25	815 385 2818 6130 3074	6.12% 2.89% 21.09% (46.02%) 60.10%	702 302 2380 4557 2267	6.80% 2.97% 23.16% (44.73%) 66.98%	766.- 748.- 2962.- 3797.- 3738.- 11512.-	882.- 380.- 2964.- 10638.- 2843.- 17707.-	$ 29,219.-
19.	85	5 6 7	1.25 1.25 1.25	4550 5545 3217	34.22% 41.63% 24.15%	3654 4074 2460	35.86% 39.99% 24.15%	7350.- 6256.- 3582.- 17288.-	4504.- 5100.- 3083.- 12788.-	$ 29,982.-
20.	95	3 6 7	1.25 1.25 1.25	2104 8650 2557	15.80% 65.01% 19.20%	1787 6467 1934	17.54% 63.47% 18.99%	1979.- 12448.- 2888.- 17301.-	2246.- 8117.- 2423.- 12788.-	$ 30,177.-
21.	57	2 6	1.25 1.25	3531 9780	26.51% 73.49%	2722 7466	26.72% 73.28%	4282.- 13890.- 18102.-	3414.- 9372.- 12786.-	$ 30,888.-
22.	86	5 6 7	1.25 1.80 1.25	8638 1308 3374	64.85% 9.82% 25.33%	6658 937 2593	65.36% 9.20% 25.45%	11428.- 2512.- 3810.- 17850.-	8350.- 1677.- 3249.- 13276.-	$ 31,128.-
23.	50	1 2 3	1.25 1.25 1.25	1282 6332 5706	9.62% 47.54% 42.84%	1015 4656 4518	9.96% 45.70% 44.34%	1495.- 9751.- 7128.- 18374.-	1275.- 5846.- 5665.- 12786.-	$ 31,156.-
24.	64	2 5	1.80 1.25	1574 11746	11.82% 88.18%	1157 9031	11.35% 88.65%	2807.- 15747.- 18554.-	2066.- 11329.- 13395.-	$ 31,948.-
25.	93	6 7	1.25 1.25	9985 3335	74.96% 25.04	7633 2555	74.92% 25.08%	14879.- 4377.- 19256.-	9482.- 3304.- 12786.-	$ 32,042.-
26.	98	3 6 7	1.25 1.80 1.25	5214 3877 4179	39.14% 29.48% 31.37%	4489 2616 3075	44.16% 25.66% 30.18%	5298.- 6653.- 4226.- 16177.-	5030.- 4688.- 3836.- 14153.-	$ 32,380
27.	94	6 7	1.80 1.25	7874 5446	59.11% 40.89%	6008 4180	58.97% 41.03%	11052.- 8498.- 19550.-	10767.- 5235.- 16002.-	$ 35,552.-
28.	35	2 6	1.80 1.80	5001 8319	37.55% 62.45%	3727 6461	36.58% 63.42%	6758.- 10743.- 17501.-	6679.- 11598.- 18277.-	$ 35,776.-

ton, while in Simulation No. 62, Rank No. 10, the fee at Site 2 has been increased to $1.80 per ton. This causes approximately a $500 increase in total community cost per week and reduces the tonnage of waste that would appear at Site 2 from about 19% of the total to about 3%. This precludes an economical landfilling operation at Site 2 and shows Simulation No. 92 to be an impractical combination of sites under these conditions.

The Transfer Station at Site No. 4 appears in a number of the simulations. It had been previously determined that the solid waste received at Site No. 4 could be transferred to Site No. 5 at a lower cost than to any other site. The percentages of total waste received at Site No. 4, appear in parenthesis in Table III-2 and have been included in the percentages for Site No. 5. With one exception, the transfer fee was added to the disposal fee and became part of the disposal cost. The exception was Simulation No. 48, Rank 18. This simulation and the unattractive economics of transfer stations for use in the Metropolitan area were discussed in the preceding Section Dl. e. of this Part III.

The amount of use a site would attract is highly sensitive to the fee charged. In Simulations 57 and 54, Ranks 21 and 24, the same two sites are used. Where the disposal fee is the same as in Rank 21, Site 2 receives 26.72% of the tonnage and Site 5 receives the remaining 73.26%. Where there is a differential in fee and Site 2 is 55 cents per ton more expensive, the percentage of tons received changes to 11.35% and 88.65%. Under a differential of this nature Site 2 tonnage would be cut by more than half.

A similar comparison can be made in Simulations 52 and 62, Ranks 5 and 10. If a 55-cent change was made in the price per ton at Site 2, the expected tonnage would drop from 19.15% to 3.29%.

Simulation No. 98 is reproduced in Table III-4 for reference and explanation. Other simulations appear in Exhibits III-1, 2 and 3.

The computer printout is in terms of vehicle types, totals for all vehicles and all sites, and vehicle distribution by disposal site. The print-out in terms of vehicle type will be useful in predicting the patterns to be expected and provided for when actual sites are designed and developed. The "Totals for all Vehicles" are in terms of cubic yards per site which, in conjunction with the topography of the site, determine the amount of land required; tons per site aid in landfill equipment selection; vehicles per site determine scale and "working face" requirements; haul cost and disposal cost together give total community cost; and percent cubic yards and percent tons were used to calculate future land requirements at each site.

The printout "Vehicle Distribution by Disposal Sites" which is Page 2, Table III-4, in effect draws the boundary line that appears in Figure No. III-3. This line divides the area into parts, each of which contain the disposal site where the sum of haul cost and disposal cost will be the least. In the case of Site 8, which did not appear in the simulations, the boundary line was drawn as discussed in Section D3.d. of this Part III.

TABLE III - 4 ECONOMIC SIMULATION NO. 98 (TYPICAL)

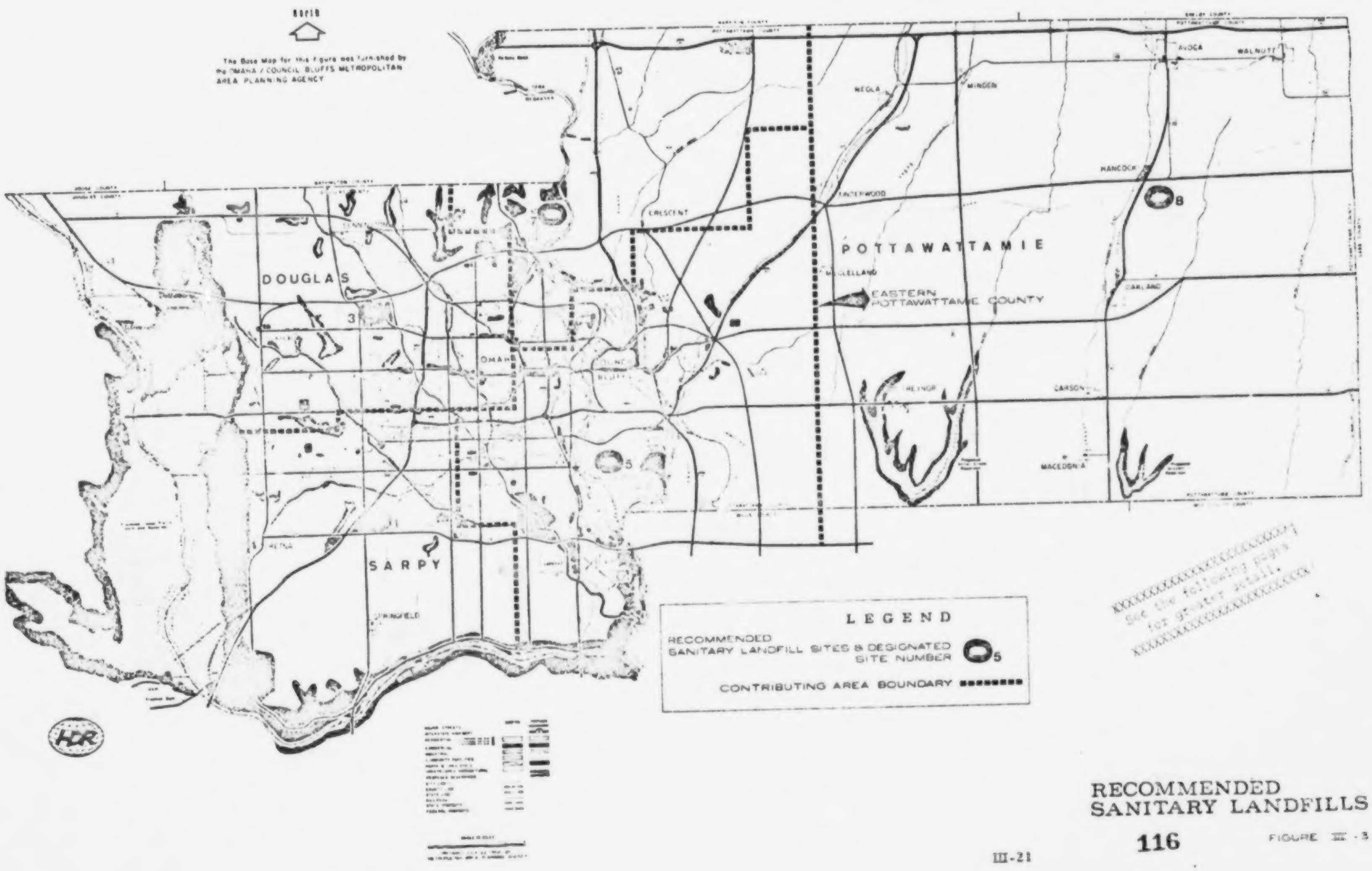
Page 1

```
SIMULATION NUMBER   98

SITE  1 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00

SITE  3 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00

SITE  5 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00

SITE  7 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00


    1 PACKER TRUCK                                                  2 DUMP TRUCK

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST        SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1       448       350         69       4.35       6.35             1       51        59         20       2.75       3.72
  2         0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
  3      1802      1367        232       4.33       7.37             3      254       331         90       2.70       4.60
  4         0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
  5      2610      1650        388       5.46       5.32             5     1306      1529        409       4.02       4.67
  6         0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
  7       562       393         92       5.62       5.34             7     1122       981        153       4.60       8.02

    3 VAN                                                           4 LIGHT TRAILER

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST        SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1        50        27         15       2.96       2.00             1        0  [illegible]        4       3.24       1.00
  2         0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
  3       131        81         54       2.53       1.92             3        9         6         16       2.12       1.00
  4         0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
  5       574       306        194       3.37       1.98             5       62        54         87       3.57       1.04
  6         0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
  7       169        80         35       3.78       2.90             7        3         2          4       3.07       1.00

    5 HEAVY TRAILER                                                 6 FLAT BED OR STAKE

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST        SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1        43         8          2       6.25       4.84             1      125       121         31       3.06       4.87
  2         0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
  3        25         7          7       4.20       1.37             3      480       384        128       2.41       3.75
  4         0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
  5       216        80         29       5.49       3.47             5     1290       802        273       3.23       4.04
  6         0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
  7       117        55         10       6.15       6.92             7      312       200         76       3.38       3.29

    7 PICK UP TRUCK                                                 8 AUTO OR STATION WGN

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST        SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1        63        50         52       2.35       1.20             1        3         2         37       2.50       0.00
  2         0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
  3       238       190        227       2.13       1.13             3       17        13        167       1.71       0.00
  4         0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
  5       999       719        918       3.07       1.03             5       51        36        452       3.42       0.00
  6         0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
  7       173       127        142       3.19       1.12             7        1  [illegible]       15       2.95       0.00

    9 TRANSFER VEHICLE                                              10 OTHER VEHICLES

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST        SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1        22         4          1       9.60       5.00             1       10        80          8       2.24      12.44
  2         0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
  3         0         0          0       0.00       0.00             3        0         0          0       0.00       0.00
  4         0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
  5         0         0          0       0.00       0.00             5        2        11          2       4.66       6.78
  6         0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
  7         0         0          0       0.00       0.00             7        0         0          0       0.00       0.00


TOTALS FOR ALL VEHICLES

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST PCT V    PCT T
  1       815       702        240     765.59     881.87     6.12     6.89
  2         0         0          0       0.00       0.00     0.00     0.00
  3      2956      2380        921    2523.23    2987.75    22.19    23.36
  4         0         0          0       0.00       0.00     0.00     0.00
  5      7118      5267       2752   10143.46    6613.37    53.38    51.70
  6         0         0          0       0.00       0.00     0.00     0.00
  7      2439      1840        527    2180.66    2302.69    18.31    18.06

        13320     10188       4440   15612.94  1276[illegible].69
```

TABLE III - 4 ECONOMIC SIMULATION NO. 98 (TYPICAL)
Page 2

VEHICLE DISTRIBUTION BY DISPOSAL SITES

SITE	VEHICLE TYPE	GEO AREA	NO. OF VEHICLES	CUBIC YARDS	TONS	AVERAGE FEES
1	1					
		25	40	275	217	9.06
		26	28	189	130	11.93
		30	1	4	3	10.06
	2					
		25	15	35	42	5.75
		26	9	12	17	9.08
		32	1	4	*	4.00
	3					
		25	5	11	7	3.60
		26	9	35	10	6.05
		32	2	4	2	4.09
	4					
		26	3	0	*	4.40
		32	1	0	*	3.75
	5					
		28	2	43	8	11.09
	6					
		25	12	52	32	5.17
		26	7	35	54	13.22
		32	5	11	7	4.08
		37	7	27	20	9.73
	7					
		24	2	3	1	4.26
		25	24	35	30	3.17
		26	15	17	12	4.17
		30	1	0	*	1.50
		32	7	6	*	3.62
		37	1	1	*	5.16
		38	2	1	*	4.07
	8					
		25	12	2	*	1.50
		26	11	1	*	3.15
		32	12	0	*	2.53
		37	2	0	*	4.10
	9					
		26	1	22	4	14.00
	10					
		25	8	10	80	14.00
3	1					
		3	2	7	6	11.30
		9	2	12	8	9.27
		15	21	112	82	6.24
		16	78	447	331	9.69
		20	79	900	730	17.31
		21	39	267	161	8.50
		22	11	57	42	7.76
	2					
		10	1	1	*	3.04
		15	5	9	12	4.09
		16	29	86	111	7.02
		20	14	31	31	6.07
		21	17	42	46	5.73
		22	24	85	130	8.99
	3					
		9	1	1	*	3.03
		15	4	11	7	3.10
		16	4	12	5	3.33
		20	23	78	53	6.14
		21	13	25	11	2.47
		22	4	4	4	3.16
	4					
		9	1	0	*	3.50
		10	1	1	*	3.02
		15	1	0	*	1.70
		16	1	2	2	3.37
		20	1	1	*	4.00
		21	3	1	*	2.02
		22	4	4	2	2.70
	5					
		16	2	3	2	5.53
		20	2	10	3	7.59
		21	3	4	2	4.27
	6					
		9	1	3	1	4.32
		10	2	11	12	9.60
		12	1	1	*	5.05
		14	1	6	7	9.65
		15	8	30	32	5.76
		16	29	100	76	5.81
		20	38	108	111	6.95
		21	35	103	83	4.90
		22	13	58	61	7.62
	7					
		2	1	1	*	6.77
		3	2	2	*	5.14
		6	1	1	*	3.80
		9	2	1	*	3.30
		10	1	2	2	3.06
		13	3	1	*	3.05
		14	2	0	*	1.09
		15	29	23	23	1.71
		16	72	80	55	3.22
		20	88	77	65	4.08
		21	32	24	10	2.70
		22	14	21	22	3.55
	8					
		9	8	1	2	2.30
		10	2	0	0	1.00
		13	1	0	*	2.05
		14	3	0	*	.09
		15	40	3	2	.71
		16	42	4	3	2.22
		20	18	2	1	2.67
		21	32	3	2	1.70
		22	23	4	3	1.57
5	1					
		18	8	63	31	12.30
		19	102	993	648	11.08
		27	40	250	164	10.59
		28	85	423	332	8.00
		29	1	4	3	10.93
		30	1	5	3	7.97
		31	2	10	6	11.22
		39	12	45	34	9.17
		137	2	17	9	13.62
		138	24	200	107	12.27
		139	68	599	295	11.63
		142	2	15	9	8.55
		143	1	6	4	6.45
	2					
		18	32	50	26	6.09
		19	149	445	583	8.93
		28	55	131	152	5.16
		29	1	6	7	13.70
		39	1	0	0	5.04
		137	6	16	27	11.46
		138	74	330	361	10.31
		139	89	318	384	9.89
		142	2	10	9	7.49
	3					
		18	1	1	*	5.28
		19	117	360	150	5.14
		27	5	20	12	5.93
		28	13	22	18	2.43
		30	4	9	6	4.50
		31	1	0	*	5.25
		39	1	7	3	4.58
		41	1	2	*	5.09
		137	2	4	3	6.04
		138	22	80	52	6.83
		139	23	74	57	6.78
		140	1	0	*	5.17
		143	1	5	2	3.41
	4					
		18	1	1	*	5.00
		19	6	9	8	4.37
		27	1	1	*	3.84
		29	1	2	3	7.44
		31	1	0	*	5.01
		41	1	0	*	3.73
		136	1	1	*	5.77
		137	4	2	4	5.59
		138	36	24	24	4.60
		139	35	22	16	4.47
	5					
		18	2	5	3	8.79
		19	19	125	44	8.53
		27	1	2	1	6.80
		28	3	11	6	4.84
		139	4	73	27	14.70
	6					
		18	9	48	20	7.10
		19	138	659	438	7.42
		27	11	47	28	6.18
		28	34	181	130	6.23
		30	12	59	30	6.37
		31	2	4	3	6.22
		39	15	95	60	8.97
		40	1	5	6	10.04
		137	7	24	17	7.72
		138	24	84	73	7.63
		139	17	94	54	7.65
		142	3	8	9	5.20
	7					
		18	6	12	8	5.44
		19	128	139	97	4.05
		27	24	26	17	3.67
		28	75	88	81	2.27
		29	6	7	*	4.40
		30	15	22	19	3.91
		31	8	10	10	5.31
		39	1	0	*	3.90
		40	4	7	8	3.59
		136	1	1	*	5.40
		137	45	40	29	5.15
		138	409	387	219	4.38
		139	288	324	236	4.23
		142	4	11	8	2.54
		143	7	7	3	1.46
	8					
		18	3	0	*	3.76
		19	20	2	1	3.04
		27	7	1	*	2.67
		28	7	0	*	1.28
		29	1	0	*	3.40
		30	4	0	*	2.31
		31	5	0	*	3.72
		39	1	0	*	2.90
		40	2	0	*	2.54
		136	1	0	*	4.40
		137	102	11	6	4.15
		138	145	19	14	3.38
		139	146	18	13	3.21
		140	4	0	*	3.64
		142	1	0	*	1.38
		143	1	0	*	.40
	10					
		138	2	2	11	11.44
7	1					
		8	24	140	105	7.62
		17	68	402	289	12.74
	2					
		8	4	9	8	4.01
		17	144	1113	973	12.85
	3					
		8	2	6	*	2.24
		17	11	109	80	6.95
	4					
		8	1	1	*	2.23
		17	3	2	1	4.68
	5					
		8	1	20	8	12.53
		17	9	97	47	13.13
	6					
		7	1	10	14	15.44
		8	15	45	39	4.56
		17	60	257	144	7.03
	7					
		7	1	1	*	2.20
		8	15	10	15	2.42
		17	125	133	109	4.54
		110	1	1	1	6.09
	8					
		8	1	0	*	1.13
		17	11	1	*	3.45
		110	1	0	*	2.40


NORTH
DOUGLAS
SARPY
POTTAWATTAMIE
EASTERN POTTAWATTAMIE COUNTY
OMAHA
COUNCIL BLUFFS
CRESCENT
NEOLA
MINDEN
UNDERWOOD
MCCLELLAND
TREYNOR
HANCOCK
AVOCA
WALNUT
OAKLAND
CARSON
MACEDONIA
SPRINGFIELD
GRETNA
3
5
8
LEGEND
RECOMMENDED SANITARY LANDFILL SITES & DESIGNATED SITE NUMBER
CONTRIBUTING AREA BOUNDARY

The Base Map for this figure was furnished by the OMAHA / COUNCIL BLUFFS METROPOLITAN AREA PLANNING AGENCY

XXXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
XXXXXXXXXXXXXXXXXXXXXXXXXX

RECOMMENDED
SANITARY LANDFILLS

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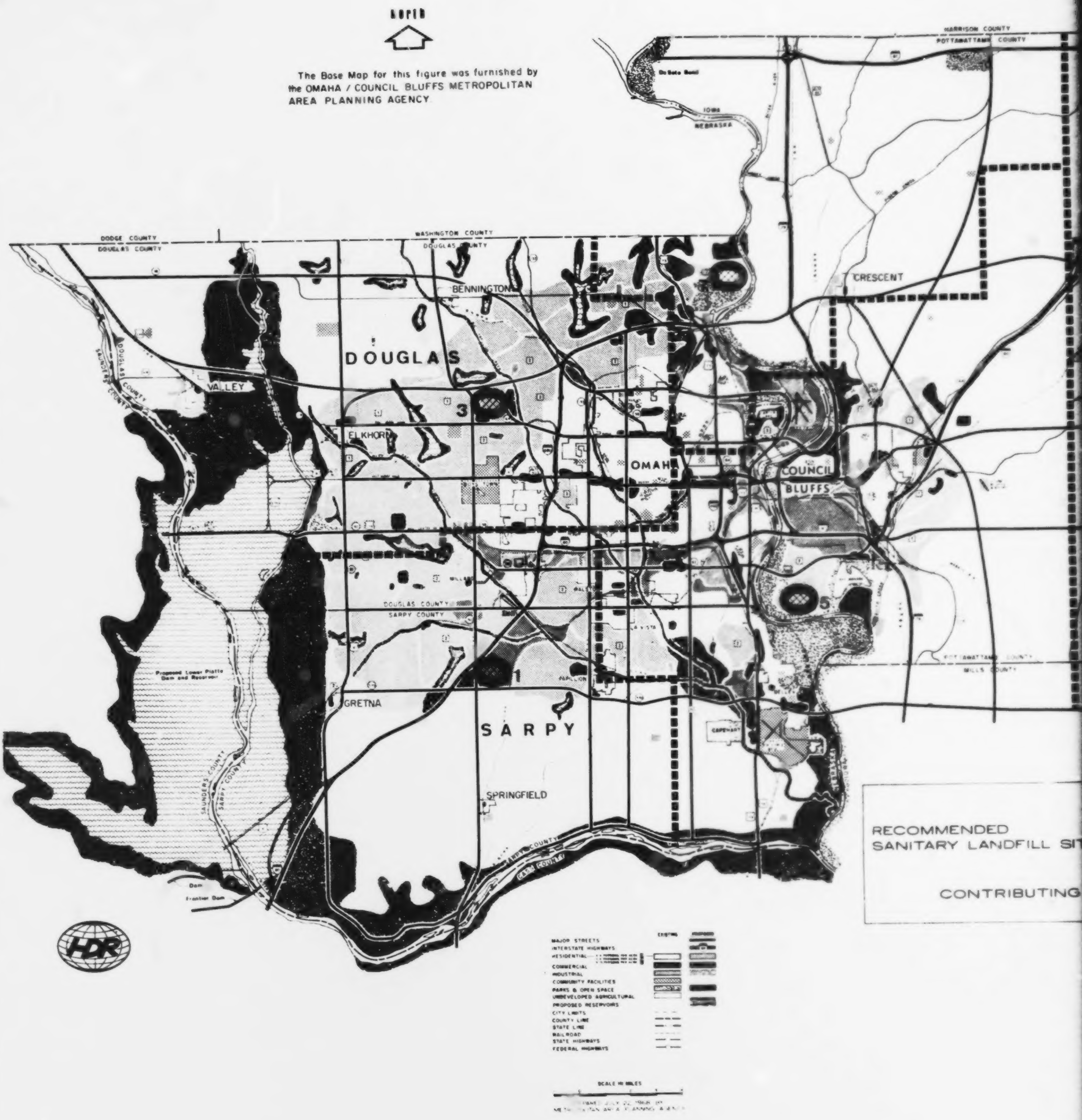
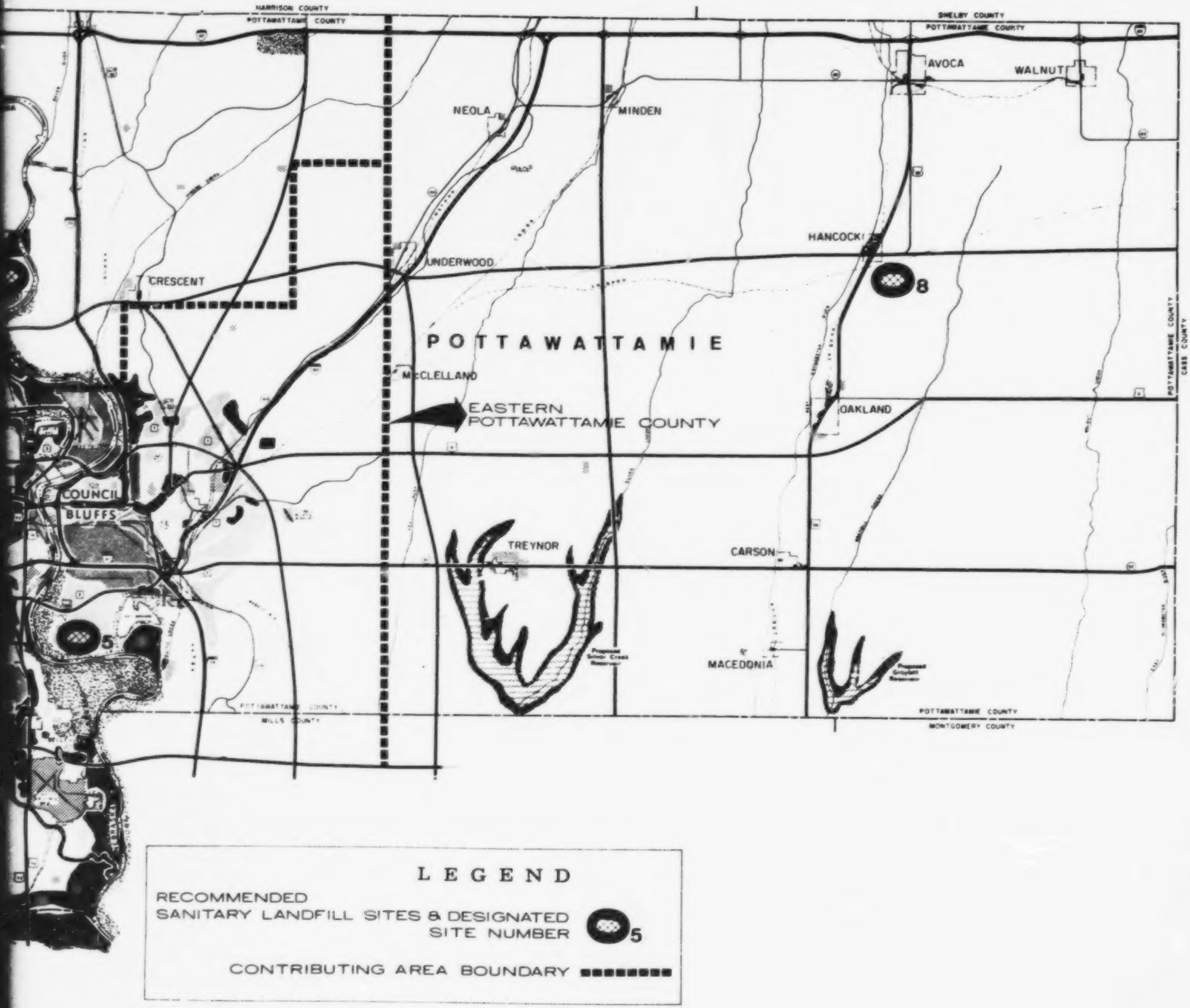
FIGURE III-3

The Base Map for this figure was furnished by
the OMAHA / COUNCIL BLUFFS METROPOLITAN
AREA PLANNING AGENCY


NORTH
HARRISON COUNTY
POTTAWATTAMIE COUNTY
De Soto Bend
IOWA
NEBRASKA
DODGE COUNTY
DOUGLAS COUNTY
WASHINGTON COUNTY
DOUGLAS COUNTY
BENNINGTON
CRESCENT
DOUGLAS
VALLEY
SAUNDERS COUNTY
DOUGLAS COUNTY
3
ELKHORN
OMAHA
COUNCIL
BLUFFS
5
DOUGLAS COUNTY
SARPY COUNTY
LA VISTA
1
PAPILLION
POTTAWATTAMIE COUNTY
MILLS COUNTY
Proposed Lower Platte Dam and Reservoir
GRETNA
SARPY
CAPEHART
SPRINGFIELD
SAUNDERS COUNTY
SARPY COUNTY
SARPY COUNTY
CASS COUNTY
Dam
Frontier Dam
EXISTING
PROPOSED
MAJOR STREETS
INTERSTATE HIGHWAYS
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
COMMUNITY FACILITIES
PARKS & OPEN SPACE
UNDEVELOPED AGRICULTURAL
PROPOSED RESERVOIRS
CITY LIMITS
COUNTY LINE
STATE LINE
RAILROAD
STATE HIGHWAYS
FEDERAL HIGHWAYS
SCALE IN MILES
PREPARED JULY 22, 1968 BY
METROPOLITAN AREA PLANNING AGENCY

RECOMMENDED
SANITARY LANDFILL SIT

CONTRIBUTING


HARRISON COUNTY
POTTAWATTAMIE COUNTY
SHELBY COUNTY
POTTAWATTAMIE COUNTY
AVOCA
WALNUT
NEOLA
MINDEN
HANCOCK
UNDERWOOD
CRESCENT
8
POTTAWATTAMIE
McCLELLAND
EASTERN POTTAWATTAMIE COUNTY
OAKLAND
POTTAWATTAMIE COUNTY
CASS COUNTY
COUNCIL BLUFFS
TREYNOR
CARSON
5
Proposed Silver Creek Reservoir
MACEDONIA
Proposed Graybill Reservoir
POTTAWATTAMIE COUNTY
MILLS COUNTY
POTTAWATTAMIE COUNTY
MONTGOMERY COUNTY
LEGEND
RECOMMENDED SANITARY LANDFILL SITES & DESIGNATED SITE NUMBER
5
CONTRIBUTING AREA BOUNDARY

RECOMMENDED
SANITARY LANDFILLS

FIGURE III-3

3. Domestic Solid Waste Collection and Disposal in Eastern Pottawattamie County.

a. General. The rural communities of Pottawattamie County, like most rural communities throughout the country, are not served by an organized solid waste collection system, and generally the waste is not disposed of in a sanitary manner.

Rural communities present special problems in solid waste handling because of their relative remoteness from each other and from Metropolitan solid waste handling systems, but with adequate cooperation between communities and with the proper organization it is feasible and economical for many rural areas to have organized solid waste handling systems. Eastern Pottawattamie County is one of these rural areas where an organized system is feasible and economical and the establishment of a solid waste handling system is recommended.

b. Collection Systems. The contract for this study and report specifically excludes the analyses of and recommendations for solid waste collection systems. But, because the disposal recommendations includes a single sanitary landfill site to serve all of this rural area in lieu of a small facility serving each community, we have included a preliminary analysis of a collection system for this area. It is important to note that the analysis which is discussed in the following paragraphs is only preliminary and that detailed work is necessary before the initiation of a collection system.

(1) Existing Collection Methods. Present collection and/or disposal of solid waste in rural Pottawattamie County is typical of rural communities. Part of the owners or occupants of dwellings and commercial establishments have private service on a regular schedule from private haulers and part haul their own waste to the local dump on a regular schedule. There is also a substantial part which burn the combustible waste and haul the residue and incombustibles to the dump on an infrequent basis.

(2) Recommended Collection System. It is recommended that the rural communities in Eastern Pottawattamie County organize a joint solid waste collection system to serve all of the communities in the area. This joint system could be organized under provisions of the "Joint Exercise of Governmental Powers" found in Chapter 28E of the Code of Iowa; or could be provided by the Public Agency recommended in Part IV of this report.

c. Scope of Collection Service

(1) General. The scope of collection service concerns:

The customers to be served
The nature of materials to be collected

The frequency of collection;
The point of collection.

(2) Customers to be Served. It is recommended that service be provided to all single family and small multiple family dwellings in McClelland, Iowa, and the 10 additional municipalities lying east of a line through McClelland.

Commercial and industrial waste generally require special collection service. This waste varies considerably in quantity and characteristics. Private haulers have satisfactorily provided this service in the past and are equipped to do so in the future. However, in the future, when a system has been established and has acquired the necessary operating skills and management techniques, the municipalities may wish to consider this service. For the immediate future, it is recommended that private contractors continue to provide commercial and industrial service.

(3) Material to be Collected. It is recommended that all domestic solid waste which can be placed in approved containers be collected regardless of quantity.

(4) Frequency of Collection Service. It is recommended that the frequency of the collection service be at least one collection each week on a five day week schedule. This system will provide the communities with regular collections with approximately 20% of the area collected each day on a Monday through Friday schedule utilizing the 8 hour work day. This type of schedule is presently employed by most collection services. There are substantial arguments for twice per week service, and such a frequency should be considered. The analysis presented in Section D 3 is based on a frequency of one collection per week.

(5) Point of Collection. It is recommended that the waste be collected at its point of storage near the customer's dwelling. Collectors convey the waste from the storage area to the vehicle by means of a large capacity, lightweight tote container. This method usually requires only a single trip onto the dwelling premises, and often more than one dwelling can be collected before returning to the vehicle.

d. Preliminary Layout of the Collection Route

(1) General. To layout a collection route it is necessary to know or assume a number of things. They include; the service area population and number dwelling units, the quantity of waste to be collected, the location of the disposal site, the road system, and the manpower and equipment necessary and their capabilities.

(2) Service Area. It has been assumed for purposes of this study that the service area is that portion of Pottawattamie County east of a line through McClelland, Iowa. That portion of the county contains 11 municipalities to be served by a collection system. The populations of these municipalities as determined by statistics of the U. S. Census Bureau and the Omaha-Council Bluffs Metropolitan area Planning Agency are shown in the following list. The numbers of dwelling units were determined by using the statistical figure of 3.3 people per dwelling unit.

Town	1970 Population	Dwelling
Avoca	1,513	459
Carson	569	173
Hancock	250	76
Macedonia	273	83
McClelland	143	44
Minden	381	116
Neola	884	268
Oakland	1,351	410
Treynor	274	83
Underwood	399	121
Walnut	725	220
Totals	6,762	2,053

(3) Waste Quantity for Collection. It is assumed that domestic solid waste generation on a per capita basis is equal to that quantity measured in the Metropolitan Area. As shown in Table II-24, the domestic waste generation per capita in 1970 is:

207,000 Tons ÷ 515,800 People = 0.4 Ton/Person/Year.

The statistical dwelling unit contains 3.3 people, therefore the average weekly generation of domestic waste is 51 pounds per dwelling unit per week.

(4) Disposal Site Location. Ideally a solid waste disposal site would be located at the centroid of all solid waste generated and disposed of in a particular area. Sometimes this location is impractical or inconvenient. The centroid of solid waste (and population) for eastern Pottawattamie County is 4 miles west of Hancock, Iowa. It would be more convenient to locate the disposal site nearer to Hancock and nearer to U.S. Highway No. 59 which is the major north-south highway in that part of the county. It is recommended elsewhere in this report that a sanitary landfill facility be established in the vicinity of Hancock, Iowa.

(5) Road System. The preliminary layout of the collection route was made using a 1968 general highway and transportation

map of Pottawattamie County prepared by the Iowa State Highway Commission. Only paved roads were considered for the collection route.

(6) Collection Manpower and Equipment. The major portion of the cost of a collection system is represented by the wages of its labor force. Consequently this is the area where careful planning can realize the greatest cost savings. This planning should minimize cost by laying out the optimum collection route to be worked by the optimum size crew with equipment that is compatible with the type and quantity of work to be accomplished.

Detailed collection system studies have shown that 2-man and 3-man collection crews both have their applications depending upon the type of route being served. In the case of eastern Pottawattamie County a 2-man crew was selected.

The collection vehicle used in the preliminary route layout is a packer-type truck with a 22 cubic yard capacity. A more detailed study and future experience may show that a 20 C. Y. truck would be adequate or that a 24 C. Y. truck is required. The difference in cost when amortized over 5 years if not great. It is important that the vehicle have adequate capacity in order to avoid making extra trips. At an average in-truck density of 581 pounds per C. Y., a 22 C. Y. packer truck could haul the solid waste from 250 dwelling units in each load.

Previous studies have shown that a 2-man crew will collect on the average 1.5 dwelling units per minute including driving time between dwellings.

Highway driving time has been computed on the basis of 50 m.p.h. which is equivalent to 1.2 minutes per mile, (1.2 M/mi).

It is assumed that the crew will work a 5-day week and devote 8 hours or 480 minutes per day (including 30-minutes break time) on the collection route.

Table III-5 shows the preliminary daily work schedule for the collection route. It is assumed that the sanitary landfill disposal facility is near Hancock, Iowa, and that the collection crew will work out of Hancock.

TABLE III-5. EASTERN POTTAWATTAMIE COUNTY DOMESTIC REFUSE COLLECTION ROUTE AND PRELIMINARY DAILY WORK SCHEDULE

MONDAY

				MINUTES
1.	Hancock to Treynor		23 mi. @ 1.2 M/mi	28
2.	Treynor 83 DU		@ 1.5 DU/M	56
3.	Treynor to Carson		10.2 mi@ 1.2 M/mi	13
4.	Carson 173 DU		@ 1.5 DU/M	116
5.	Carson to S. L. F.		12.8 mi@ 1.2 M/mi	16
6.	Unload			5
7.	S. L. F. to Macedonia		15.8 mi @ 1.2 M/mi	19
8.	Macedonia 83 DU		@ 1.5 DU/M	56
9.	Macedonia to Oakland		9.4 mi @ 1.2 M/mi	12
10.	Oakland 167 DU		@ 1.5 DU/M	112
11.	Oakland to S. L. F.		6.4 mi @ 1.2 M/mi	8
12.	Unload			5
13.	Breaks			30
14.	Totals	506 D. U.	77.6 mi	476

TUESDAY

1.	S. L. F. to Oakland		6.4 mi @ 1.2 M/mi	8
2.	Oakland 243 DU		@ 1.5 DU/M	162
3.	Oakland to S. L. F.		6.4 mi @ 1.2 M/mi	8
4.	Unload			5
5	S. L. F. to Walnut		13.4 mi @ 1.2 M/mi	17
6.	Walnut 220 DU		@ 1.5 DU/M	147
7.	Walnut to S. L. F.		13.4 mi @ 1.2 M/mi	17
8.	Unload			5
9.	Breaks			30
10.	Totals	463 D. U.	39.6 mi	400

WEDNESDAY

1.	S. L. F. to Avoca		7.2 mi @ 1.2 M/mi	9
2.	Avoca 250 DU		1.5 DU/M	167
3.	Avoca to S. L. F.		7.2 mi @ 1.2 M/mi	9
4.	Unload			5
5.	S. L. F. to Avoca		7.2 mi @ 1.2 M/mi	9
6.	Avoca 209 DU		@ 1.5 DU/M	140
7.	Avoca to S. L. F.		7.2 mi @ 1.2 M/mi	9
8.	Unload			5
9.	Breaks			30
10.	S. L. F. to Hancock			4
11.	Hancock 76 DU		@1.5 DU/M	51
12.	Hancock to S. L. F.			4
13.	Unload			5
14.	Totals	535 D. U.	30.8 mi	447

Table III-5 (cont'd)

THURSDAY				MINUTES
1.	S. L. F. to Neola		18.0 mi @ 1.2 M/mi	22
2.	Neola 250 DU		@ 1.5 DU/M	167
3.	Neola to S. L. F.		18.0 mi @ 1.2 M/mi	22
4.	Unload			5
5.	S. L. F. to Neola		18.0 @ 1.2 M/mi	22
6.	Neola 18 DU		@ 1.5 DU/M	12
7.	Neola to Minden		4.0 mi @ 1.2 M/mi	5
8.	Minden 116 DU		@ 1.5 DU/M	78
9.	Minden to S. L. F.		14.0 mi @ 1.2 M/mi	17
10.	Unload			5
11.	Breaks			30
12.	Totals	384 DU	72 mi	385

FRIDAY				
1.	S. L. F. to McClelland		23 mi @ 1.2 M/mi	28
2.	McClelland 44 DU		@ 1.5 DU/M	30
3.	McClelland to Underwood		4 mi @ 1.2 M/mi	5
4.	Underwood 121 DU		@ 1.5 DU/M	81
5.	Underwood to S. L. F.		21 mi @ 1.2 M/mi	26
6.	Unload			5
7.	Breaks			15
8.	Totals	165 DU	48 mi	190

WEEKLY TOTALS

2053	Dwelling Units Collected
268	Miles, Highway Driving
1375	Minutes = 22.9 Hours Actual Collection Time
1898	Minutes = 31.6 Hours Total Route Time

e. Collection System Cost Estimate

(1) General. The cost estimate for the collection system based on current prices and wages, appears in Table III-6. The following paragraphs discuss each major item considered.

(2) Basic Cost Data. The basic cost data are the items used to develop total annual cost of operation. They include: the initial purchase of the collection vehicle; the cost of a small building to be built at the landfill site to provide facilities for the operating personnel; the cost of maintaining, operating, and amortizing the operating equipment plus a rental fee for a spare truck if required; and miscellaneous costs, overhead, and contingencies.

(3) Annual Costs. The annual costs include the expense of repaying the initial debt and the recurring annual expense of operating personnel and equipment.

The debt expense provides for a 6% - 5 year amortization to purchase the original packer truck, and a 6% - 20 year amortization to pay for the personnel facilities and garage.

Annual operating expenses include salaries, equipment costs, miscellaneous costs and contingencies.

The sum of debt expense plus operating expense gives the total annual cost of $31,700. This figure is used to compute the annual fee to be charged each dwelling unit.

(4) Collection Fee Computation. The collection fee or cost per dwelling unit is the sum of collection cost plus debt service reserve plus disposal cost.

The collection fee was developed from the estimate of annual cost for providing collection service to 2053 customers.

The cost of debt service reserve is not an actual cost but is a revenue that must be provided and set aside for protection of the bond buyers if the capital funds are raised through the sale of bonds. It is taken as 40% of the annual debt expense of $3300.

The disposal cost is based upon an annual domestic waste quantity of 1.32 tons per dwelling unit and a disposal fee of $1.40 per ton as recommended in Part III-E-7 of this report.

TABLE III-6. COST ESTIMATE, DOMESTIC WASTE COLLECTION EASTERN POTTAWATTAMIE COUNTY

A.			BASIC COST DATA			
	1.		Initial Purchase of Equipment (one time purchase only) 1 packer truck @$11,000		$11,000	
	2.		Personnel Facilities & Garage 800 s.f. @ 10.00/s.f.		8,000	
	3.		Operating Personnel			
			Salaries	$17,150		
			Fringe Benefits and Salary Expense + 17%	2,950	20,100	
	4.		Operating Equipment, Maintenance, Operation and Amortization 1 truck @ $3,900 1 rental @ 500		4,400	
	5.		Misc. Expense, Overhead & Contingency		3,900	
B.			ANNUAL COSTS			
	1.		Debt Expense			
		a.	Initial Purchase of Equipment 5 yrs. @ 6% = 0.23740 .2374 x 11,000 =	$11,000	$2,600	
		b.	Personnel Facilities and Garage 20 yrs. @ 6% = .08718 .08718 x 8,000	$8,000	700	
		c.	Total Debt Expense			$3,300
	2.		Operating Expense			
		a.	Operating Personnel		20,100	
		b.	Operating Equipment		4,400	
		c.	Misc. & Contingency		3,900	
		d.	Total Operating Expense			28,400
	3.		Total Annual Cost			$31,700
C.			COLLECTION FEE COMPUTATION			
	1		Annual Cost	$31,700		
	2		Subscribers	2,053 Dwelling Units		
	3.		Cost Per Dwelling Unit			
		a.	Collection 31,700 ÷ 2053 DU =		$15.48	
		b.	Debt Service Reserve 40% (3300.) = $1,320 1,320 ÷ 2,053 DU =		0.64	
		c.	Disposal 1.32 tons per Dwelling Unit @ $1.40		1.85	
		d.	Annual Cost Per Dwelling Unit		$17.97	

f. Summary. The economics of an organized rural community effort for the collection and disposal of domestic solid waste compare favorably with those of large metropolitan systems.

The annual fee of approximately $18.00 per year per dwelling unit for the communities in eastern Pottawattamie County provides for once-a-week collection and disposal of all domestic solid waste of residential subscribers. Presently, subscribers to the City operated collection system in Council Bluffs pay $15.00 annually for a service which collects kitchen waste only. The City of Omaha system, operated under a contract, provides for collection and disposal of all domestic and some commercial waste. The cost of the domestic portion is approximately $12.00 per dwelling unit. A recent study in Des Moines, Iowa, recommended an annual fee of $10.80 per dwelling unit for once-a-week collection and disposal of domestic waste.

The present costs to the residents in the communities in eastern Pottawattamie County for hauling and disposing of domestic solid waste are not known, although private service rates of $24.00 to $36.00 per year are common. It is reasonable to assume that one system serving the aggregate community is considerably less expensive than that of each household hauling and disposing of its solid waste or contracting privately for that service. In addition, the nuisance of several open burning dumps would be eliminated by the sanitary landfilling of the waste at one disposal site.

Open burning dumps have been declared unlawful after April 1, 1970, in the State of Iowa by its Government. An organized system for the sanitary collection and disposal of solid waste in eastern Pottawattamie County is suggested to be a feasible and economical answer to this recent legislation.

4. Sanitary Landfill Cost Estimates

a. General. The cost estimates for five combinations of landfill sites are summarized in Table III-7. The itemized cost estimate for the combined operation of Sites 1, 3, 5, 7 and 8 is presented in Table III-8. In the following paragraphs each major cost item is considered and discussed. Detailed estimates for other combinations of landfill sites are found in the Appendix, Exhibits III - 4 through 7. The estimates are based upon current prices and wages. It will be necessary to adjust these costs prior to implementation of the landfill operations, when the final designs are made and final conditions are known.

The estimate in Table III-8 for the 5-site operation is based upon operating the 2 smaller sites, Sites 1 and 8 for eight hours per day, 5 days per week, and sites 3, 5 and 7 for 12 hours per day, 6 days per week. It is probable that sites 3, 5 and 7 would be open to the public eleven hours per day with one hour per day allotted at the end of the day to permit all refuse to be covered and incidental clean-up to be accomplished. Additional details of individual site operations are found in Paragraph i, and Table III-9.

b. Basic Cost Data (Refer to Table III-8)

(1) Land Costs. Land costs were developed from the estimated land requirements as seen in the table and further discussed in Part III-E of this report. An informal investigation of land prices for the selected general areas provided the estimated land cost per acre.

(2) Initial Site Development. These costs were developed by analyzing the required physical developments necessary for placing the landfill sites in readiness for operation.

(3) Annual Site Maintenance and Development. These costs are for the expected general maintenance and annual expansion required for site upkeep and continued operation.

(4) Equipment Purchase. This estimated cost is for the equipment recommended for operation of the 5 sites. The distribution of the equipment is itemized in Table III-9. This cost is a one-time expenditure for the initial procurement of the equipment. Funds for replacement of equipment are provided for in the operating costs as discussed in the following paragraph. There are many types of heavy equipment suitable for sanitary landfilling operations. The preliminary equipment selection made for estimating purposes in this report is based upon anticipated conditions at the landfill sites. Final equipment selection can be made only after the actual sites are designed and more extensive soil analyses have been made. The equipment selections should minimize total equipment costs which include initial cost, maintenance and operating costs, and replacement costs.

(5) Equipment Maintenance, Operation and Amortization. These estimated costs are for the maintenance, operation (excluding labor) and amortization of the required equipment for the 5 sites. The costs are based upon operating the primary equipment 8 or 12 hours per day, 5 or 6 days per week.

Support equipment such as the grader, tractor-mower, and water trucks would be shared by the 4 sites in the Metropolitan area and rented at Site 8 in eastern Pottawattamie County. Equipment operation hours are itemized in Table III-9. Included in the equipment hourly rate is the estimated amortization of each piece of equipment. This amortization will prepay the cost of replacement by establishing an equipment escrow fund to be used with trade-in equipment for necessary replacements. The spare equipment would be available to any of the sites when needed.

(6) Labor. These are the estimated costs for the personnel required to operate the required equipment and facilities of the 5 sites, exclusive of the management categories in the Agency operation. Wage rates include fringe benefits. For additional details of labor distribution see Table III-9 and the discussion thereof.

(7) Agency Headquarters and Maintenance Building. This estimated cost is to provide for the facilities and equipment necessary to the Agency operation. This facility would be located at one of the landfill sites and would be in addition to the personnel facility provided for the labor force at that site. Extensive maintenance of landfill equipment would be handled at the Headquarters Maintenance facility while day to day preventive maintenance would be accomplished at the individual sites.

(8) Agency Operation. This is the estimated cost for the wages of management personnel and for the operating overhead of the Agency.

(9) Miscellaneous Expense and Contingencies. This is the estimated cost of the miscellaneous expenses and contingencies which normally could be expected during the course of Agency operations.

c. Annual Costs. The following annual cost computations are based upon the itemized requirements presented in Table III-8, in which some expenditures are one-time initial expenses and the remaining are annual reoccurring expenses. The one-time expenses are assumed to be financed through the sale of revenue bonds, repayable at 6% interest over a 20-year period.

ANNUAL COST DATA

1.	One-Time Expenses (20 yrs. @ 6% = 0.08718)		
	Land Cost	$ 996,000	
	Initial Site Development	482,000	
	Equipment Purchase	509,000	
	Hdqtrs. Bldg.	130,000	
		08718 x $2,117,000=	$184,600
2.	Reoccurring Annual Expense		
	Site Maint. & Development	$ 81,500	
	Equip. M. O. & A.	241,500	
	Labor	238,100	
	Agency Operation	67,600	
	Misc. & Contingencies	62,000	
			$690,700
3.	Total Annual Cost		$875,300

d. Fixed and Variable Annual Costs. Following is a summary of fixed and variable annual costs for the 5 sites. It is assumed that the fixed costs will be necessary expenditures which will occur each year and will not change as the quantities of waste change throughout the years, while the variable costs will be dependent upon the quantity of solid waste received each year. The following costs are used in the development of Unit and Total Operation Costs:

	Fixed Costs		Variable Costs	
One-Time Expense	$184,600			
Annual Development			$ 81,500	
Equip. MO&A	17,000*		224,500	
Labor	139,600		98,500	
Agency Operation	67,600			
Misc. & Contingencies			62,000	
	$408,800	+	$466,500	= $875,300

*Pickup Trucks & Miscellaneous Equipment

e. Quantities for Unit and Total Costs. The following quantities were established from the information given in Table II-26.

		Ac. Ft.	Tons
1st Year	1970	628	751,200
4th Year	1973	580	691,000
Average Year	1982	744	884,300
Final Year	1995	978	1,158,400

These quantities are used to establish unit and Total Operation Costs for the 5 sites.

f. Unit and Total Costs of Operation. The following computations establish Unit and Total Costs of operation for the 5 sites.

Part of the cost of operation of the disposal facilities are fixed costs which do not vary with the amount of solid waste disposed of. The remainder of the costs are directly proportional to the amount of solid waste and because of this, the unit cost of operation will vary each year.

(1) 1st Year 1970 - 628 Ac-Ft. or 751,200 Tons
Fixed Costs $408,800 -:- 628 Ac-Ft. = $650/Ac-Ft.
Var. Costs $466,500 -:- 628 Ac-Ft. = $740/Ac-Ft.
Total $875,300 $1,390/Ac-Ft.

$875,300 -:- 751,200 Tons = $1.16/Ton

(2) 4th Year 1973 580 Ac-Ft. or 691,000 Tons
Fixed Cost $408,800
Variable Cost 580 Ac. Ft. x $740/Ac-Ft. 429,200
$838,000

838,000 ÷ 691,000 Tons = $1.21/Ton
838,000 ÷ 580 Ac-Ft. = $1,445/Ac-Ft.

(3) Average Yr. 1982 - 744 Ac-Ft. or 884,300 Tons

Fixed Cost	$408,800
Variable Cost 744 Ac-Ft. x $740/Ac. Ft.	550,600
	$959,400

$959,400 ÷ 884,300 Tons = $1.09/Ton
$959,400 ÷ 744 Ac-Ft. = $1,290/Ac-Ft.

(4) Final Year 1995 - 978 Ac-Ft. or 1,158,400 Tons

Fixed Cost	$408,800
Variable Cost 978 Ac-Ft. x $740/Ac-Ft.	$723,700
	$1,132,500

$1,132,500 ÷ 1,158,400 Tons = $0.98/Ton
$1,132,500 ÷ 978 Ac-Ft. = 1,160/Ac-Ft.

g. Bond Debt Service Reserve. Bond buyers insist that the revenue be higher than the theoretical amount required to meet debt service payments. This extra revenue is known as debt service reserve or premium. In this estimate it is based upon 40% of the debt service and is equal to 0.4 ($184,600) or $73,800 per annum. It is not actually a cost but must be included in revenue computations. The debt service reserve will be a fixed amount, but the unit cost of this reserve varies with the total tonnage as follows:

1st yr. 1970 $73,800 ÷ 751,200 Tons = $0.10/Ton
4th yr. 1973 $73,800 ÷ 691,000 Tons = $0.11/Ton
Avg. yr. 1982 $73,800 ÷ 884,300 Tons $0.09/Ton
Final yr. 1995 $73,800 ÷ 1,158,400 Tons = $0.07/Ton

h. Summary of Unit Costs

Year	Operation Cost $/Ton	Debt Service Reserve Cost $/Ton	Total Unit Cost $/Ton
1970	$1.16	$0.10	$1.26
1973	$1.21	$0.11	$1.32
1982	$1.10	$0.09	$1.19
1995	$0.99	$0.07	$1.06

i. Individual Site Data. The data in Table III-9 is a breakdown of the basic site data which supports the cost estimate in Table II-8 for Sites 1, 3, 5, 7 and 8.

(1) Refuse Accumulation and Land Requirements. The accumulation of solid waste from 1970 through 1995 determined by the summation

of annual projections was divided by the anticipated average depth of landfilled refuse to determine the necessary land area required to contain that refuse. That acreage was multiplied by 1.2 to provide 20% additional area for roads, setbacks, site screening berms and other non-fillable areas. It was assumed that land would be purchased in multiples of 40 acres.

(2) The daily quantities of refuse were obtained by dividing annual projections by the number of days per year each site is expected to be open to the public. Sites 1 and 8 were assumed to be open and operating 5 days per week or 260 days per year while the remaining 3 sites would be open and operating 6 days per week or 312 days per year. These daily quantities are indicative of the level of activity at the individual sanitary landfill facilities and were used to make the tentative selection of the landfill equipment and the labor force requirements.

(3) The initial site development and cost thereof is itemized for each individual site in this section of the table.

(4) The cost and distribution of the landfill equipment is itemized in this part of the table. Each site has what might be termed primary equipment to be used exclusively at an individual site. In addition the sites will share other equipment such as the grader, mower, trucks, and spare equipment.

(5) The solid waste that each site would receive will require a certain number of hours of landfill equipment operation. The estimate of the required hours of operation appears in this part of the table. These hours will vary depending upon the level of activity at each site, the length of the working day, and the number of days per week the site is in operation.

The hours of operation for equipment which is shared by the landfill sites is prorated to those sites on the basis of tons per day of refuse received and/or land area.

It is assumed that a grader and mower will be rented when required at Site 8 in eastern Pottawattamie County.

Spare equipment will generally replace equipment that is "down" for repairs or maintenance but it may be used during peak hour of operation, if necessary. For the latter reason, a few hours of operation have been assigned to the spare equipment to provide for this possibility and for other contingencies.

(6) Equipment operator hours are determined by summing equipment operations hours exclusive of the hours shown for spare equipment and exclusive of the hours shown for the scrapers which are not self-propelled.

At Site 8 it has been assumed that the loader will operate 6 hours per day - 5 days a week or 1560 hours per year, but the operator will work 8 hours per day - 5 days a week or 2080 hours per year. Rental equipment is assumed to require 300 additional operator hours per year. Therefore, the total operator hour requirement is 2080 hours + 300 hours = 2380 hours.

(7) Labor hours per site are itemized in this portion of the table. In addition to the equipment operator hours discussed in the previous paragraph, the hours for laborers, foremen and gatekeepers are shown. It is assumed that laborers will work forty-hour week. Sites 1 and 8 because of their relative low level of activity have no laborers. Sites 3 and 7 have 2 laborers each, and Site 5 has 4 laborers. Neither Sites 1 and 8 have foremen as such. Sites 3, 5 and 7 are assigned foremen hours at the rate of 8 hours per day, 6 days per week. Gatekeeper hours are based upon 8 or 12 hours per day and 5 or 6 days per week, depending on the site.

Site 8 in eastern Pottawattamie County is essentially a one-man operation with the equipment operator handling equipment operation in addition to acting as gatekeeper and taking care of any incidental chores.

TABLE III- 7 RECAP - COST ESTIMATES

	SITE COMBINATION	3, 5	3, 5, 7	1, 3, 5	1, 3, 5, 7	Recommended 1, 3, 5, 7, 8
	ITEM					
1.	Land Cost	$1,000,000	$928,000	$960,000	$976,000	$996,000
2.	Initial Site Development	380,000	404,000	362,500	453,000	482,000
3.	Annual Mntce. & Site Dvlpmt.	60,000	70,000	65,000	80,000	81,500
4.	Equipment Purchase	443,000	462,000	494,000	475,000	509,000
5.	Equipment M. O. & A.	242,000	235,000	266,800	227,300	241,500
6.	Labor	182,800	219,900	192,600	228,000	238,100
7.	Hdqtrs. & Mntce. Bldg.	130,000	130,000	130,000	130,000	130,000
8.	System Operation	65,000	65,000	65,000	65,000	67,600
9.	Misc. & Contingencies	60,000	60,000	60,000	60,000	62,000
10.	Debt Expense	170,300	167,700	169,700	177,300	184,600
11.	Operating Expense	609,800	649,900	649,400	660,300	690,700
12.	Total Annual Cost	$ 780,100	$817,600	$819,100	$837,600	$875,300
13.	Bond Debt Srv. Reserve	68,100	67,100	67,900	71,000	73,800
14.	Total Required Revenue	$ 848,200	$884,700	$887,000	$908,600	$949,100
15.	Fixed Cost	348,400	371,200	353,000	400,100	408,800
16.	Variable Cost	431,700	446,400	466,100	437,500	466,500
17.	1970 Tonnage	723,000	723,000	723,000	723,000	751,200
18.	1970 Cost/Ton	$1.18	$1.22	$1.23	$1.26	$1.26

TABLE III-8 BASIC COST DATA FOR SITES 1, 3, 5, 7 and 8

1. Land Cost

Site	Acres	Cost/Ac.	Cost
No. 1 South West	80	$1200	$ 96,000
No. 3 North West	200	1200	240,000
No. 5 South East	480	1000	[illegible]80,000
No. 7 North East	160	1000	160,000
No. 8 E. Pott. Co.	40	500	20,000
Total	960		$996,000

2. Initial Site Development

Site 1 South West	66,500
Site 3 North West	112,000
Site 5 South East	162,500
Site 7 North East	112,000
Site 8 E. Pott. Co.	29,000
Total Initial Development Cost	$482,000

3. Annual Maintenance and Site Development

Site 1 South West	10,000
Site 3 North West	20,000
Site 5 South East	30,000
Site 7 North East	20,000
Site 8 E. Pott. Co.	1,500
Total Annual Maintenance and Development	$ 81,500

4. Equipment Purchase

$509,000

Table III-8 Continued

5. Equipment Maintenance, Operation and Amortization

Item	Hrs./Yr.	Rate/Hr.	Cost/Yr.
Track Loader, 170 FWHP	2,080	$10.00	$ 20,800
Track Loader, 275 FWHP	2,496	15.00	37,400
Track Loader, 115 FWHP	1,560	7.00	10,900
Dozers, 125 FWHP	7,488	9.00	67,400
Scrapers	(2,496)*	3.00	7,500
Compactor, 400 FWHP	2,496	19.00	47,400
Grader, 125 FWHP	2,496	5.50	14,800
Water Trucks	2,496	4.00	10,000
Tractor Mower	1,248	2.00	2,500
Trailer	(100)	3.00	300
Dump Truck	(200)	5.00	1,000
Pickup Trucks			5,000
Misc. Rental			12,000
Grader	200	5.50	1,100
Tractor Mower	100	2.00	200
Dozer, Spare, 125 FWHP	(200)	9.00	1,800
Wheel Loader, Spare, 130FWHP	(200)	7.00	1,400
Total	25,856		$241,500

6. Labor

Equipment Operators	23,180	4.25	$ 98,500
Laborers	16,640	3.25	54,100
Foremen	7,488	4.75	35,600
Gatekeepers	13,312	3.75	49,900
Total			$238,100

7. Headquarters and Maintenance Building

Office and Maintenance Building	$ 80,000
Office and Maintenance Equipment	50,000
	$130,000

8. Agency Operation

Salaries	$ 51,000
Overhead	16,600
	$ 67,600

9. Miscellaneous Expense and Contingencies $ 62,000

*NOTE: Equipment hours in parentheses are not included in equipment operator hours for labor costs.

TABLE III - 9 BASIC SITE DATA FOR SITES 1, 3, 5, 7 and 8

		Site 1	Site 3	Site 5	Site 7	Site 8
1.	**Waste Accumulation and Land Requirement**					
a	Accumulation in acre feet* (19,870)	1800	4350	9770	3290	665
b	Fill depth in feet	30	30	24	24	24
c	Fill area required in acres	60	145	407	137	28
	x 1.2 for site area required	72	174	489	165	33
d.	Purchase - acres (960 total)	80	200	480	160	40
	*Compacted and seasonally adjusted					
2.	**Tons of Waste per Day**					
a	Operation, days per week	5	6	6	6	5
b	Tons per day 1970**	220	510	1210	410	110
c.	Tons per day 1995**	480	850	1750	580	130
	**Seasonally adjusted					
3.	**Initial Site Development and Cost**					
a	Buildings, Scale House & Pers Fac	20,000	30,000	30,000	30,000	10,000
b	Scales	----	9,000	18,000	9,000	----
c	Scale Equipment	----	10,000	10,000	10,000	----
d	Watermain	10,000	10,000	15,000	10,000	5,000
e	Perim Fence	3,500	6,500	10,000	6,500	2,300
f	Entr Fence	2,000	2,000	2,000	2,000	1,600
g	Gravel Surfacing	2,000	4,000	10,000	4,000	900
h	Grading	8,000	15,000	30,000	15,000	3,000
i	Landscaping	6,000	8,000	12,500	8,000	2,000
j.	Area Lighting	2,000	3,500	5,000	3,500	1,000
k	Apron Pavement	10,000	10,000	10,000	10,000	2,000
l	Miscellaneous	3,000	4,000	10,000	4,000	1,200
	Totals	$66,500	$112,000	$162,500	$112,000	$29,000
4	**Equipment Costs and Distribution**					
a	3 Track Loader	46,000	----	70,000	----	28,000
b	2 Dozers	----	35,000	----	35,000	----
c	2 Scrapers	----	25,000	----	25,000	----
d	1 Compactor	----	----	74,000	----	----
e	1 Grader	2,500	5,000	12,500	5,000	----
f	2 Water Trucks	----	4,000	8,000	4,000	----
g	1 Tractor Mower	200	400	1,000	400	----
h	5 Pickup Trucks	4,000	4,000	4,000	4,000	4,000
i	1 Lowboy Trailer	1,400	1,400	1,400	1,400	1,400
j	1 Dump Truck	2,400	2,400	2,400	2,400	2,400
k	Miscellaneous	1,600	2,200	4,000	2,200	2,000
l	1 Dozer (Spare)	7,000	7,000	7,000	7,000	7,000
m	1 Wheel Loader (Spare)	8,400	8,400	8,400	8,400	8,400
	Totals (Total equipment $509,000)	$ 73,500	$ 94,800	$192,700	$94,800	$53,200
5	**Equipment - Hours per Year**					
a	Track Loader, 170 FWHP	2,080	----	----	----	----
b	Track Loader, 275 FWHP	----	----	2,496	----	----
c	Track Loader, 115 FWHP	----	----	----	----	1,560
d	Dozer	----	3,744	----	3,744	----
e	Scraper	----	(1,248)	----	(1,248)	----
f	Compactor	----	----	2,496	----	----
g	Grader	248	500	1,248	500	----
h	Water Truck	----	624	1,248	624	----
i	Tractor Mower	124	250	624	250	----
j	Grader (Rental)	----	----	----	----	200
k	Tractor Mower (Rental)	----	----	----	----	100
l	Trailer	(20)	(20)	(20)	(20)	(20)
m	Dump Truck	(40)	(40)	(40)	(40)	(40)
n	Dozer (Spare)	(40)	(40)	(40)	(40)	(40)
o	Wheel Loader (Spare)	(40)	(40)	(40)	(40)	(40)
	Total	2,592	6,506	8,252	6,506	2,000

NOTE: 1 40Hr /Wk x 52 Wk/Yr = 2080 Hr /Yr
48 Hr /Wk x 52 Wk /Yr = 2496 Hr /Yr
72 Hr /Wk x 52 Wk /Yr = 3744 Hr /Yr
2 Equipment hours in parentheses are not included in equipment operator hours for labor costs

		Site 1	Site 3	Site 5	Site 7	Site 8
6	**Annual Equipment Operator Hours**	2,452	5,118	8,112	5,118	2,380
7	**Labor Hours per Year**					
a	Equip Operators (Total 23,180)	2,452	5,118	8,112	5,118	2,380
b	Laborers (Total 16,640)	----	4,160	8,320	4,160	----
c	Foremen (Total 7,488)	----	2,496	2,496	2,496	----
d	Gatekeeper (Total 13,312)	2,080	3,744	3,744	3,744	----

5. Summary - Resulting Site Combinations. The 28 economic site simulations shown in Table III-3 were reduced to four for final consideration. All simulations containing Sites 2, 4, or 6, were deleted when Sites 2, 4 and 6 were eliminated for reasons discussed in Part III.D.6.

The four remaining simulations provided four combinations of sites shown in Table III-10. A fifth combination resulted by adding Site 8 to the Sites 1, 3, 5, 7 combination.

Site No. 8 did not appear in the economic simulations because it was impractical to include as part of this study the detailed measurement of waste quantities at the numerous small disposal facilities in eastern Pottawattamie County. The site combination containing Site No. 8 could not be simulated and the figures in Table III-10 for that combination were arrived at by computation and/or proportion.

The five site combinations were further analyzed and compared by developing the cost estimates summarized in Table III-7 and by developing the community costs which appear in Table III-10 which are discussed in the following paragraphs:

To develop the 1970 community costs for a particular site combination, the calculated initial disposal fee and the projected 1970 solid waste quantities and population were used.

The "Calculated Initial Disposal Fee" was determined by cost estimate after the economic simulations (or in the case of Site No. 8, the computations) provided the necessary information for determination of land, equipment, and labor requirements at the sites.

The "1970 Haul Cost/Week" was determined by multiplying the simulation haul cost by the ratio of 1970 tons of waste to the simulation tons of waste. In the combination containing Site No. 8 the Haul Cost/Week was assumed to be in direct proportion to population served. The haul cost was determined by multiplying the haul cost for the Sites 1, 3, 5, 7 combination by the population ratio of 535,940/515,800. The assumption made, implies that unit haul costs in rural Pottawattamie County are equal to unit haul costs in the Metropolitan area. The average haul distance in the rural area will be greater but the round trip time will be less because of less restrictive speed limits.

The "1970 Disposal Cost/Week" was determined by multiplying the simulation disposal cost by the ratio of 1970 tons to the simulation tons and then by the ratio of initial fee to simulation fee. The simulation fee in these combinations was uniformly $1.25 per ton. The 1970 Disposal Cost/Week for the Sites 1, 3, 5, 7, 8 combination was obtained by multiplying the 1970 tons per week by the disposal fee of $1.40 per ton.

The "1970 Community Cost/Week" is the sum of haul cost and disposal cost.

TABLE III. 10 COMPARATIVE FIGURES - FIVE SITE COMBINATIONS

Site Combination	Sites 3, 5	Sites 3, 5, 7	Sites 1, 3, 5	Sites 1, 3, 5, 7	Sites 1, 3, 5, 7, 8
1970 Population	515,800	515,800	515,800	515,800	535,940
1970 Solid Waste, Tons	723,000	723,000	723,000	723,000	751,200
* Calculated Initial Disposal Fee,$/Ton	1.22	1.28	1.29	1.32	1.32
1970 Haul Cost/Week	22,170	21,627	21,857	21,301	22,132
1970 Disposal Cost/Week	17,444	17,863	18,002	18,421	19,069
1970 Community Cost/Year	2,059,928	2,053,480	2,072,668	2,065,544	2,142,452
1970-1995 Tons Per Day					
Site 1 (5 days/week)	-	-	220-480	220-480	220-480
Site 3 (6 days/week)	1100-1840	700-1360	920-1440	510-850	510-850
Site 5 (6 days/week)	1220-1760	1210-1750	1210-1760	1210-1750	1210-1750
Site 7 (6 days/week)	-	410-590	-	410-580	410-580
Site 8 (5 days/week)	-	-	-	-	110-130
Land Area Required, Acres Per Site					
Site 1	-	-	80	80	80
Site 3	400	240	320	200	200
Site 5	520	480	480	480	480
Site 7	-	160	-	160	160
Site 8	-	-	-	-	40

* These fees are based upon the reduction of solid waste quantities expected in the fourth year of operation (1973) and are used for purposes of direct comparison of the 5 potential site combinations.

The "1970 Community Cost/Year" is 52 times the weekly cost.

It should be noted that the 1970 Community Cost/Year will be less than present day costs. Haul costs will be reduced because of the reduced haul times and distances provided by multiple disposal sites.

Disposal costs will be reduced because the fee of $1.40 per ton recommended in this report for the operation of Sites 1, 3, 5, 7 and 8 is 20¢ less than the present fee at the Douglas County Sanitary Landfill. The present contract between the City of Omaha and the privately operated sanitary landfill east of the Mormon Bridge provides for the disposal of 100,000 tons of waste per year at a cost of $180,000 or $1.80 per ton.

Of the five combinations of sites shown in Table III-10, four are developed and analyzed for the intended use by the Metropolitan area and the adjacent rural areas of the three counties.

Although the two-site combination of Sites 3 and 5 is the most economical, this combination does not provide the convenience to the community, nor would it serve the future expanded Metropolitan area nearly as well as the Sites 1, 3, 5, and 7 combination.

Either of the combinations containing three sites is an improvement over the two-site combination, but neither is the optimum combination required to satisfy the present and future needs of the community. The addition of a third facility at Site 7 is quite economical and it would receive the quantities of solid waste now and in the future to make it self-sustaining but it does nothing for Sarpy County and southwestern Douglas County. The addition of a third facility at Site 1 is also reasonably economical and even though its immediate use is somewhat marginal, its projected use recommends its establishment, and its location satisfies both the present and future requirements of western Sarpy County and southwestern Douglas County. Both Sites 1 and 7 have points in their favor, but neither when individually in combination with Sites 3 and 5 present a satisfactory solution to the 3-county area solid waste disposal problem.

The combination of sites which does meet the present and future needs of the Metropolitan area is the combination of Sites 1, 3, 5 and 7. The added convenience provided the community and the locations which provide for the expansion of the community far outweigh the additional cost of less than 1/2 of 1% required to add Sites 1 and 7 to the basic 2-site combination of Sites 3 and 5.

To further illustrate the advantages of the multiple site combination of 1, 3, 5 and 7 in the Metropolitan area, the savings that the City of Omaha could realize on its present 10-year solid waste collection contract were investigated. It was found that during the survey week of October 2-8, 1968, 1708.88 tons of waste were collected and hauled away by the City's contractor at a cost of $20,637.53 or an average cost of $12.08 per ton. If at that time, the City had had the option of directing its contract hauler to any of the 4 sites instead of only being able to utilize existing Site 2, the average cost would have been $11.69 per ton. The savings for that week would have been $665.65, and over a year's time this amounts to approximately $34,000. The savings result solely from the shorter haul distances provided by the multiple disposal site system. The City of Omaha could realize the savings through the Overhaul provision in the collection contract. The collection contract will be in effect through 1978 and cost adjustments will be made each year dependent upon the Consumer Price Index of the previous year.

The recommendation of Site 8 near Hancock, Iowa is independent of, and in addition to, any combination of sites considered for the Metropolitan area. Facilities for the 3-county area would be incomplete without a sanitary landfill in eastern Pottawattamie County. Site 8 adds 28,200 tons of solid waste, and 20,140 people to the corresponding figures in Table III-10 for operation of any combination of sites for the Metropolitan area.

6. Recommended Disposal Facilities. Five solid waste disposal facilities are recommended for the three county study area. Their general locations and service areas are shown in Figure III-3. The following is a general description of the area in which the site should be located and the area which the site will serve.

Site Number 1, a sanitary landfill in the vicinity of the intersection of Interstate 80 and U. S. Highway 50, to serve central and western Sarpy County, southwest Douglas County, and southwest Omaha.

Site Number 3, a sanitary landfill in the vicinity of 120th and Fort Streets in Douglas County to serve west Omaha and northwestern Douglas County.

Site Number 5, a sanitary landfill west of Lake Manawa in Pottawattamie County to serve Council Bluffs and southwestern Pottawattamie County, Bellevue and eastern Sarpy County and Omaha.

Site Number 7, a sanitary landfill north of Dodge Park in the northeast corner of Douglas County to serve north Omaha, northeast Douglas County, and northwest Pottawattamie County.

Site Number 8, a sanitary landfill near Hancock, Iowa to serve eastern Pottawattamie County.

The three potential facilities under consideration which were not selected were eliminated for the following reasons:

Site 2. Site 2 is the existing sanitary landfill immediately east of the Mormon Bridge in Pottawattamie County. Site 2, rather than Site 7, would have been selected if it were not for its future questionable accessibility and the problems which might be encountered in conversion from private to public operation.

This selection would have been made even though most of the vehicles using the facility would be required tc pay toll bridge fees in addition to disposal fees.

It is expected that the access to Site No. 2 will be appreciably changed by the completion of Interstate 680 and cause the site to become uneconomical because of extended haul distances and times. This site is privately operated and as such, fees are necessarily higher than those of a non-profit, tax exempt organization.

If the accessibility of Site 2 were to remain unchanged and if it could be operated by a public agency with the resulting fee reduction, then the site should be selected in lieu of Site No. 7. Comparison of simulations No. 52 containing Site No. 2 and No. 98 containing Site No. 7, which rank 5th and 9th respectively in Table III-3, shows that the savings to the community would be approximately 1.7%.

Site 4. The City of Omaha recently converted its incinerator facilities at Site No. 4 to a transfer station. Transfer stations have been discussed previously and were shown to be uneconomical under the minimum design standards assumed and therefore have not been recommended as part of this system of solid waste disposal facilities.

The existing transfer station at Site No. 4 is presently equipped to handle approximately 100 - 120 tons of refuse per day and remains open 7 days a week. Referring to Simulation No. 100 ranked No. 2 in Table III-3, it is seen that with a transfer fee of $1.08 per ton($2.33-$1.25 Disp. = $1.08 trnsf) which is based on a minimum of 420 tons per day, the transfer station would receive 769 tons per week or an average of 110 tons per day, a quantity less than that necessary to make the station self supporting. Examination of Simulation No. 100 reveals that less than 8% of the tons of waste would appear at Site No. 4. The area served by the transfer station is nearly fully developed and waste generation is expected to increase only slightly so that it becomes apparent that Site No. 4 would never become self-supporting and would require a continued subsidy. A more complete discussion of transfer stations is presented in Part III. D. 1.

Site 6. This site was recommended by people interested in this solid waste disposal study. It was subsequently tested by site selection criteria and by the simulation process and found to be unsatisfactory. Access to the site is through residential areas which would create traffic problems in these areas. The most logical combination of facilities which would include Site No. 6 would be Sites Nos. 3, 6 and 7. This combination does not adequately serve western Sarpy County or western Pottawattamie County and with this combination of sites, Site No. 6 would receive 65% of the total waste quantity. The land available for filling at Site No. 6 is approximately 90 acres out of a total of 120 acres, and with the site receiving 65% of the waste it would last only 3 to 5 years. Simulation No. 95 containing Sites Nos. 3, 6 and 7 ranks 20th in "Total Community Cost" in Table III-3.

An important part of the site selection process was to determine if a site or a combination of sites would be properly located and of adequate size to serve the future requirements of a growing population in the expanding communities. The map showing present and future land use (Figure III-3), and the solid waste quantity distribution made by the computer in the economic simulations were used to determine if there was a reasonable relation between the land area served by a site and the measured quantity of waste a site would receive. The developed land areas served in 4 different site combinations for the year 1968 were determined by planimeter. The individual areas for each combination were converted to a percentage of the total area and compared to the percentages of solid waste received at the sites in the economic simulations. In all cases in the four combinations of sites used, the percentage figures agreed within 2%. This close agreement established the basis for predicting future annual site use and aided in the determination of total land required at individual sites for the particular combination of sites being considered.

Annual site use for each year of the design period 1970 - 1995 was determined by multiplying the annual increase in the quantities shown in Table II-24 by the predicted percentage of solid waste received at a site during that year, and then adding that result to the previous years quantities with 1968 as the base year. The predicted percentage of facility use each year was assumed to vary uniformly from 1968 to 1995. The percentage of use in 1968 was taken from the economic simulations. The percentage of use in 1995 was determined by planimeter from the map (Fig. III-3) showing future land use.

7. Recommended Disposal Fees. Solid waste disposal fees should be set to provide the revenue required to make the system of facilities completely self supporting. In Section D. 4. f. of this Part III, the costs of operation are shown. Four critical years are analyzed: the first year; the fourth year, when the volume is reduced due to the expected reduction in Special Tree waste;the average year and the final year. The fourth year is critical. When these fourth year operating costs are added to the Debt Service Reserve for that year, as shown in Section D. 4. h., the total required revenue is equal to $1. 32/ton. This is 8¢ per ton higher than the first year. We recommend the initial fee be based on the fourth year requirement and that the fee be rounded off to an even $1. 40. The actual fee to be charged will be based on a new estimate which must be prepared after the actual final conditions are known. For purposes of this report a fee of $1. 40 per ton is used. Under the estimated condition, this fee would bring in a surplus during the first few years. This surplus could be placed into a reserve to be used as costs of operation increase due to inflation.

After the fourth year, the unit costs are reduced due to the increased tonnage. It is entirely possible that a fee based on the fourth year cost may be adequate for several years after that time.

We recommend the following schedule:

Recommended Fee Schedule

Basic fee	$1. 40/ton
Minimum fee	$1. 00
Private autos and station wagons	No charge

Automobiles, if not adequately provided for, create problems at a sanitary landfill. They are definitely a nuisance and danger if permitted to unload at the "working face" of the landfill where trucks and heavy equipment are operating. Fatal accidents involving people inexperienced in landfill operations have occurred in the working area of a landfill. Automobile drivers and juvenile occupants would substantially increase the possibility of such accidents. In addition, autos often interrupt landfill activities because of their inability to negotiate soft, wet ground and their susceptibility to tire failures. The amount of material delivered in automobiles is very minor. In Part II, it was shown that automobiles delivered only 1% of the volume and only 0. 5% of the tonnage whereas they represented 15% of the traffic. For these reasons and because automobiles will often appear at a sanitary landfill when it is closed, special facilities should be made available to them.

These special facilities should include large containers exterior to the landfill proper, and access by hard surface roads. The elimination of any charge for these facilities eliminates the need of a fee collector and the facilities permit normal landfill operations to proceed without the problems caused by automobiles.

The additional revenue produced through the minimum fee is almost exactly equal to that lost through the free service offered to private automobiles.

Of the 5 recommended sanitary landfill facilities, Sites 1 and 8 would initially operate without scales. At these 2 sites, a different fee schedule equivalent to a disposal fee of $1.40 per ton should be established. We recommend the following:

Fee Schedule Sites 1 and 8 Only

Minimum fee	$1.00
Pickup trucks (without sideboards)	Minimum charge
Light trailers	Minimum charge
Packer trucks	$.55 per CY of rated capacity
Private automobiles and station wagons	No charge
All other vehicles	$.35 per CY of waste

E. SITE DEVELOPMENT

1. Development of a Flat Site

a. General. Flat land is generally suitable for development using multiple layers of waste. The cover material can be taken from the land in a cut and cover type operation. Site 5 will be used as an example in this discussion.

b. Amount of Land Required. The amount of land required depends on the amount of waste and the depth of fill, plus additional land for roads, setbacks, sight screening and landscaping and operational spaces. It is assumed that the land acquisitions will require purchasing full parcels of land which would be not less than 40 acre increments. Therefore, it may be necessary to make adjustments in order to take an even parcel.

The amount of cover dirt available within a flat site is generally dependent upon the depth of the water table. The water table at Site 5 is normally 10' to 15' below the ground surface. Excavation of the site to a depth of 7.3' will provide the necessary cover dirt for 3 - 8' layers of waste, a final cover of 3 feet, the site screening berms around the site, and road grading.

It is estimated that 20% additional land will be required for roads, setbacks, sight screening, etc. The total land purchase is estimated as follows:

(1)	Land for filling	
	9,770 ac. ft. ÷ 24 ft. =	407 acres
(2)	Roads, etc.	
	407 acres x 20%	+ 82
	Subtotal	489
(3)	Less land for even parcel purchases	- 9
	Total Land to be Purchased	480 acres

Based on a purchase of 480 acres, it was assumed the land would consist of 3 quarter-sections.

c. Initial Development of the Site. Before any operations can commence, the site must be designed and developed. It is recommended that the initial development be done by a Contractor following plans and specifications prepared by an Engineer. The initial development would consist of the following items:

(1) Scale house, gate house and scale equipment.

(2) Equipment and personnel facilities.

(3) Agency headquarters.

(4) Water supply and mains.

(5) Fencing.

(6) Roads and drainage.

(7) Grading and landscaping.

(8) Yard and street lighting.

In the cost estimate, the initial site development at Site 5 is estimated to cost approximately $162,500. Some of the initial site development is shown in Figure III-4 which illustrates the development of a flat site into a sanitary landfill.

The items listed above are self-explanatory except for the grading and landscaping. One major grading item would be the construction of a sight screening berm around that part of the site which will be filled first. As filling progresses, the berm will be extended. The purpose of the berm is to completely screen the site operations from view from the road. It will also act as a windbreak to aid in litter control. The berm should be planted to grass or other suitable ground cover. The berm and the area between the berm and the property line should be landscaped with trees and shrubs. The construction of the berm and the landscaping are necessary parts of the entire operation and add substantially to public acceptance. The expense of these items are minimal when compared to the operational cost.

d. Operation of the Site. The amount of earth needed for daily cover, final cover, berms and roads is approximately 5 1/2 million cubic yards over a period of 26 years. Taking this earth from the fillable area requires a cut of approximately 7.3'.

Starting at Elevation - 7.3 ft. and adding 8 ft. of waste and 8 inches of cover for each lift, the approximate levels for the fills would be as follows:

Lift	Bottom	Fill		Top
First	- 7.3	+8.7	=	+ 1.4
Second	+ 1.4	+8.7	=	+ 10.1
Third	+10.1	+8.7	=	+ 18.8
Final Cover	+18.1	+2.3	=	+ 21.1

The landfilling can start at Elevation - 7. 3 in the area where the initial development earth was excavated. As this space is being filled, the cover dirt required is excavated from the immediately adjacent space, thus creating additional area with a bottom elevation of -7. 3.

The filling should be from the bottom of the lift with trucks dumping at the foot of the active face and the dozer compacting and pushing the waste up from the bottom. Bottom dumping has advantages over dumping at the top and pushing the waste down the slope.

The active face should be between 150 and 200 feet wide depending on the traffic. As the first lift is filled over an area approximately 200' wide x 1,000' long, the top surface of the first lift becomes available for the second lift. When this first 200' x 1,000' pass of the first lift is complete, the second lift should start. The second lift can be filled to an elevation of 10. 1'. It starts at the same point the first lift started and can cover the same 200' x 1,000 except for maneuvering room needed around the edges. By the time the second lift is complete, to the extent it has covered as much of the first lift as possible, the filling can return to the -7. 3' elevation in the space excavated while the first and second lifts were being filled. This second pass on the level of the first lift will widen the top surface of the first lift to the extent that additional area is available for the second pass of the second lift. Once this second pass of the second lift is completed, the third lift can be started on top of the second lift.

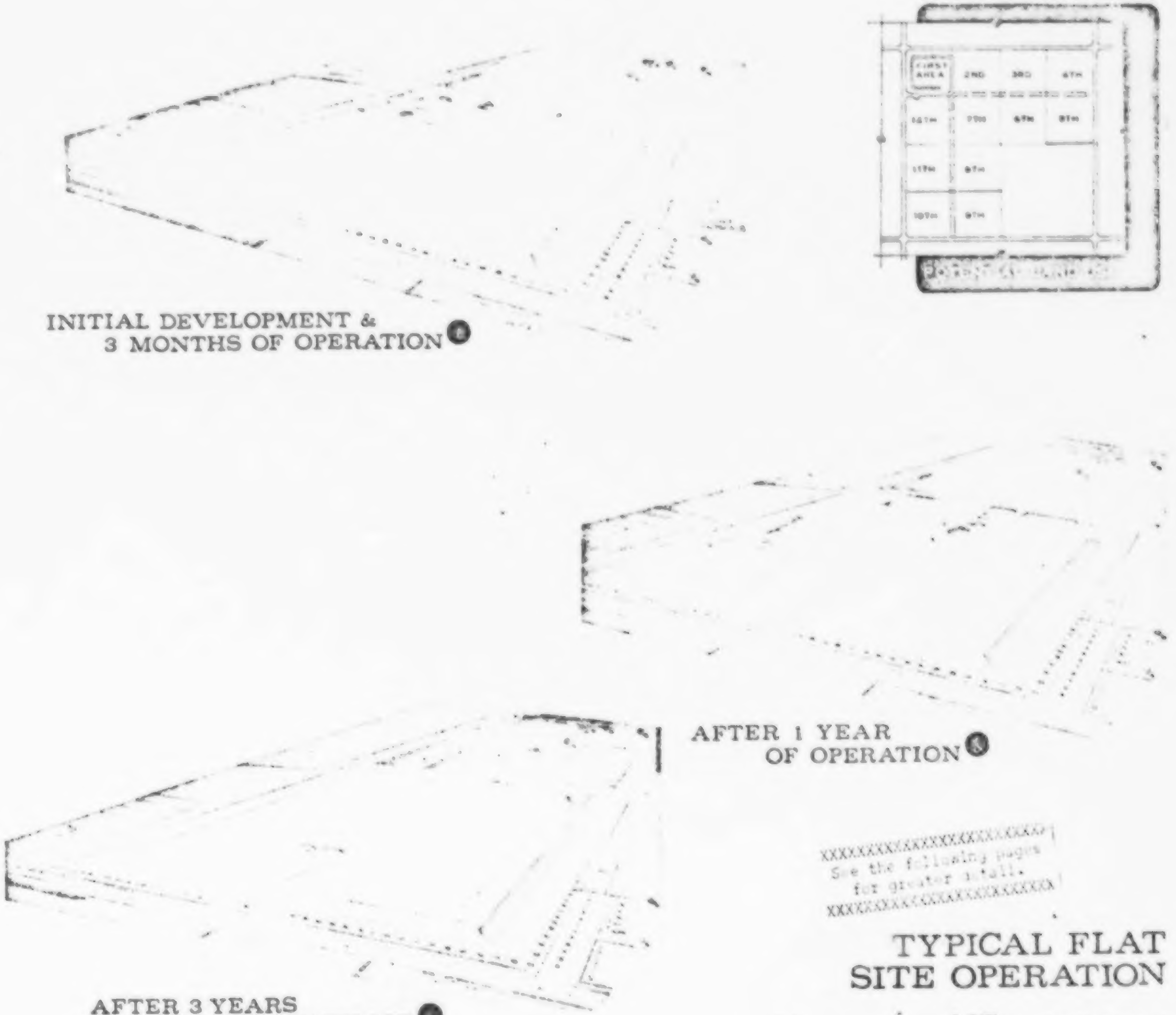
The process of building lift upon lift and then returning to the bottom to widen the base is necessary to build up to the top of the third lift as soon as possible. It is at this (+18. 8') level that the final earth cover is placed. This cover material amounts to approximately 1/3 of the total earth moved. Therefore, it is desirable to reach the top as soon as possible so excavated material from the -7. 3' level can be brought directly to the +18. 8 level without rehandling.

In Figure III-4, the site operation is shown. The first view shows the site after the first few months of operation. The first pass of the first lift has been completed. The first pass of the second lift is in progress while additional cut is being made on the -7. 3' level.

The second view shows the site after approximately one year. The +18. 8' level has been reached. The operation from this stage until the completion of this area consists of widening the base and adding additional lifts on top until the area has all been filled to elevation +18. 8'.

The third view shows this area filled and the operation moved to the adjacent area on the opposite side of the fill road.

The fill road leading from the scale and entrance area to the fill area would be built in the initial development to an elevation of +10. 1. As the third lift is placed, the road would be raised in the fill area, to reach the top of the third lift at elevation +18. 8' for access to this level.


FIRST AREA
2ND
3RD
4TH
12TH
7TH
6TH
5TH
11TH
8TH
10TH
9TH

INITIAL DEVELOPMENT &
3 MONTHS OF OPERATION

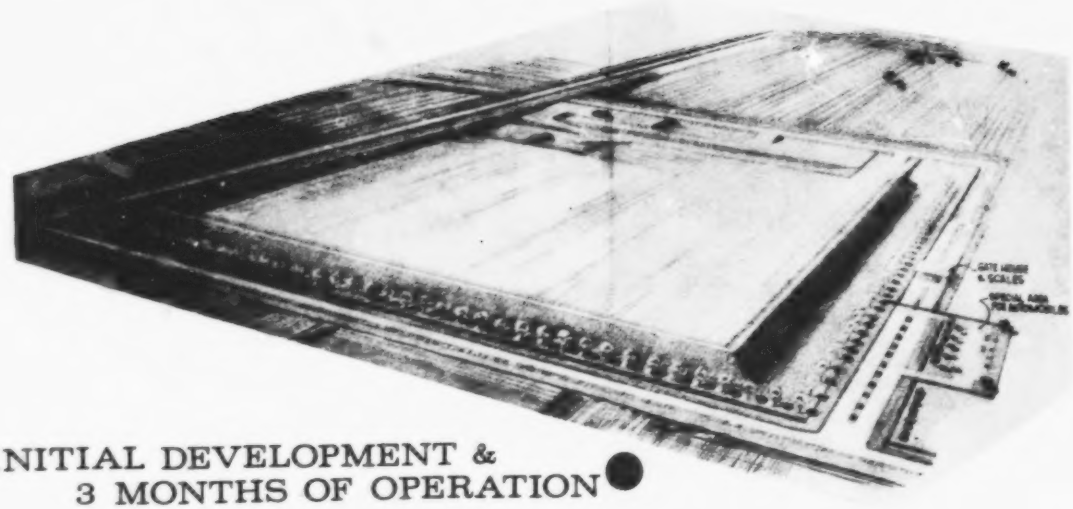
AFTER 1 YEAR
OF OPERATION

AFTER 3 YEARS
FIRST AREA IS FILLED

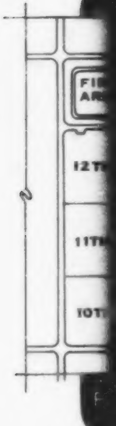
XXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
XXXXXXXXXXXXXXXXXXXXXXXXX

TYPICAL FLAT
SITE OPERATION

FIGURE III-4


GATE HOUSE & SCALES
SPECIAL AREA FOR [illegible]

INITIAL DEVELOPMENT &
3 MONTHS OF OPERATION ●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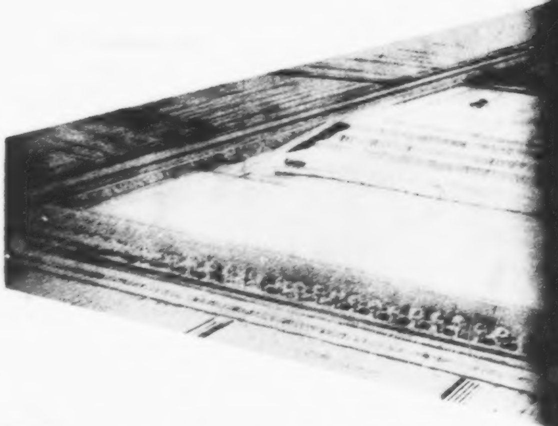
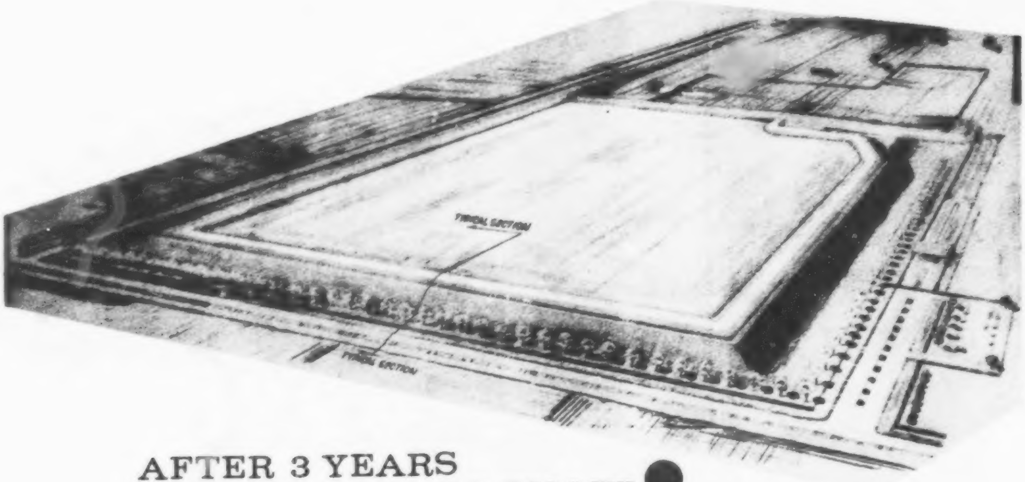


AFTER 1 YEAR
OF OPERATIO


TYPICAL SECTION
TYPICAL SECTION

AFTER 3 YEARS
FIRST AREA IS FILLED ●

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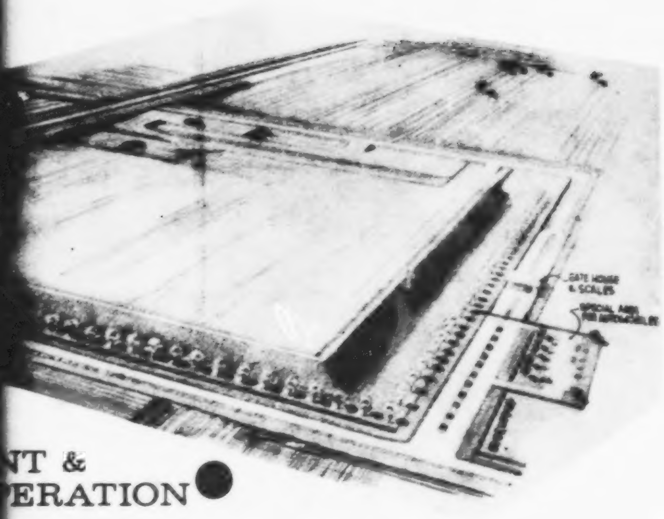
SITE


GATE HOUSE & SCALES
SPECIAL AREA

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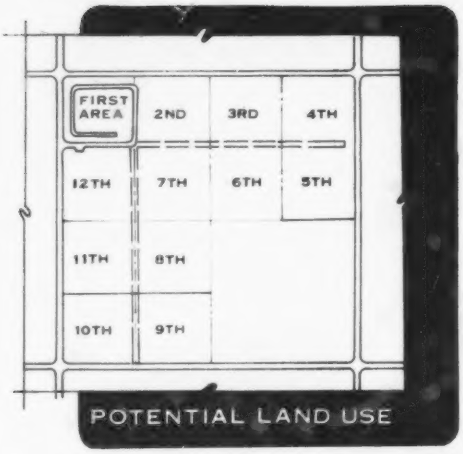
ERATION


FIRST AREA
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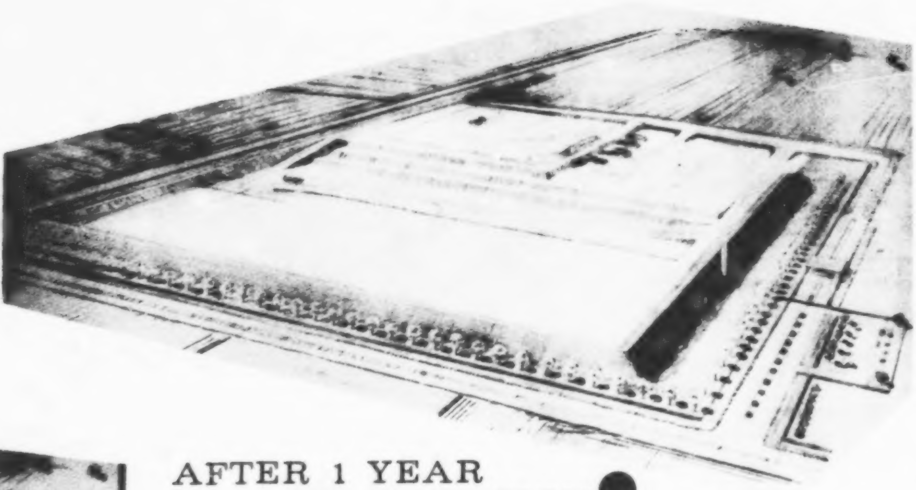
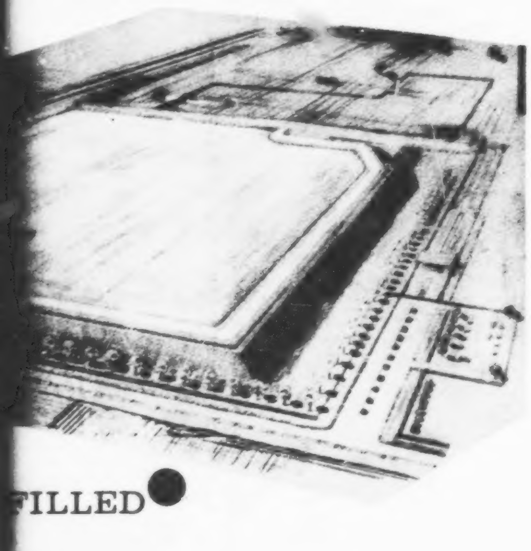
9TH

POTENTIAL LAND USE



AFTER 1 YEAR
OF OPERATION



FILLED

TYPICAL FLAT SITE OPERATION

2. Development of a Hilly Site

a. General. Site 3 is used as an example in this discussion. The land in this area is hilly containing one large gully which could be developed using typical gully filling methods. Cover material can be taken from the gully bottom and sides in a combination cut and cover and borrow type operation.

b. Amount of Land Required. The amount of land required depends on the depth of fill plus additional land for roads, setback, drainage, sight screening and landscaping and operational space. Since the gully is irregular in shape it will be necessary to purchase the parcels of land which surround and contain the gully. The depth of fill varies from point to point within the gully. The volume that can be filled is determined by laying out the final top surface contours and computing the volume between the original ground and the final cover.

The site illustrated in Figure III-5 shows the necessary land which is approximately 200 acres. The principle gully on the site is shown filled to a top elevation of 1200 ft. (MSL), and can contain 4350 acre feet.

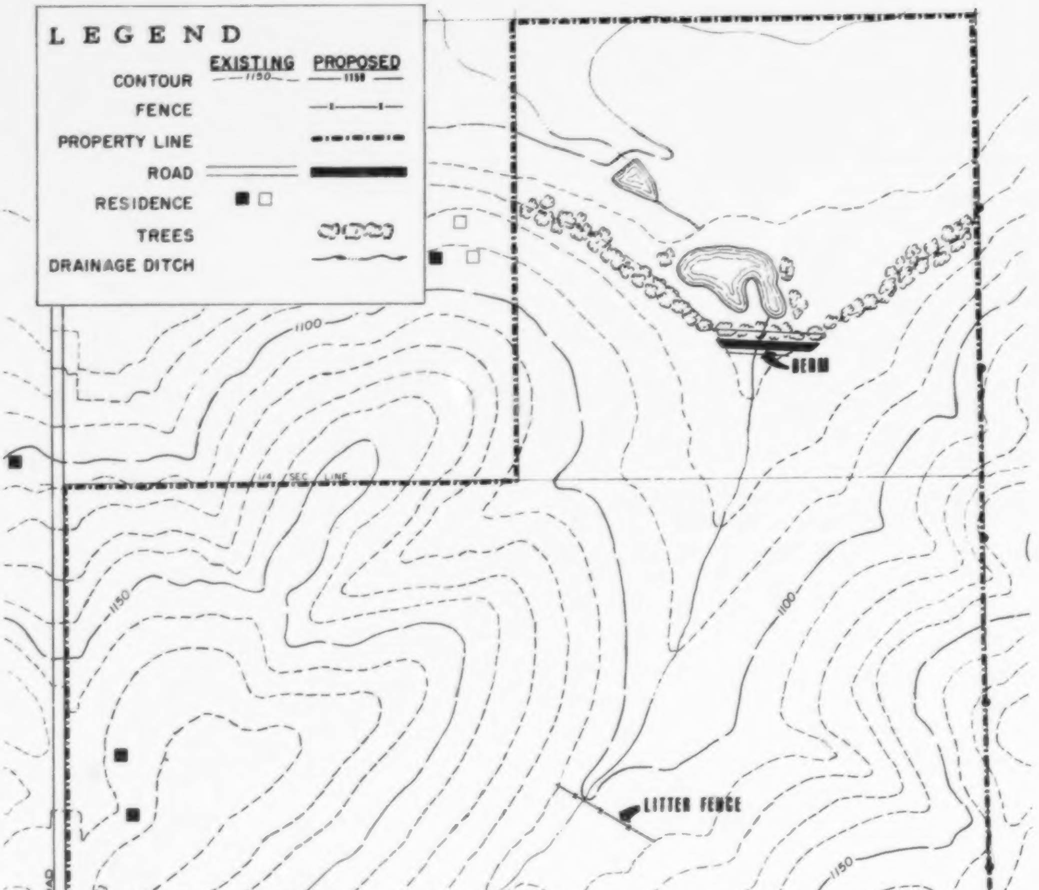
c. Initial Development of the Site. Before any operation can commence, the site must be designed and developed. The procedure and items of work would be similar to that described for a flat site, except the details of the design will be completely different. The major site screening can be accomplished by landscaping. During the initial years while the landscaping was maturing, the operation would be hidden from view deep in the gully. An initial berm would be constructed across the lower end of the site and landscaped, but this berm would be limited in length and height.

Although the berm construction would be less than that shown for the flat site, the temporary road construction would be more extensive. Roads would be required for access from the permanent perimeter road to the active face of the fill.

Details of the site development were not worked out to the extent shown for the flat site. The costs for initial development were estimated to be $112,000.

d. Operation of the Site. The earth for cover can be taken from the bottom and side walls of the gully as the work progresses. The amount of cut must be calculated to cover the many lifts which will be made plus the final cover on top of the completed fill. The calculation must be based on the final design which will vary depending on which specific site is selected.

The great depth of fill in this type of site has a distinct advantage over a site filled to a 10 to 15 foot depth which is commonly used, due to a reduced volume required final cover material. The final cover is recommended to be approximately 3 feet thick compared to a daily cover of approximately 8 inches thick. If a single lift were used it would require a final cover. If two lifts were used the final cover requirement per lift would be cut in half. Similarly, each additional lift reduces the percentage of final cover per unit volume filled. This is also true for the three lift flat site proposed for the northeast area.


LEGEND
EXISTING
PROPOSED
CONTOUR
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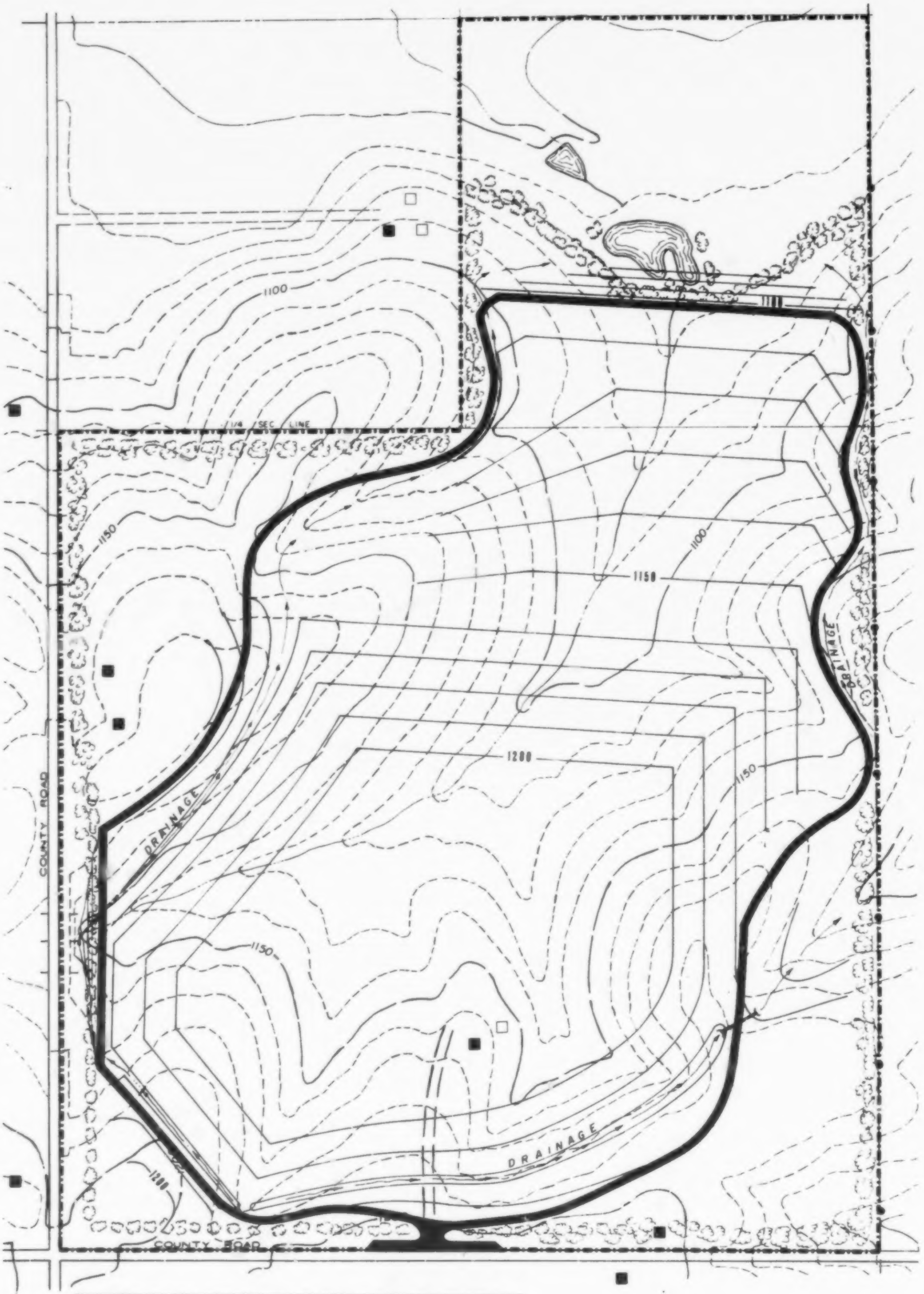
1150
FENCE
PROPERTY LINE
ROAD
RESIDENCE
TREES
DRAINAGE DITCH
1100
1150
1200
1/4 SEC. LINE
BERM
LITTER FENCE
COUNTY ROAD
WORKING AREA
ENTRANCE & WEIGHING FACILITIES
OPERATING FACILITIES AREA
SPECIAL AUTOMOBILE AREA
SERVICE ENTRANCE & EXIT

INITIAL DEVELOPMENT


1/4 SEC LINE
1100
1150
1100
1150
1150
1200
1150
1150
1200
DRAINAGE
DRAINAGE
DRAINAGE
COUNTY ROAD
COUNTY ROAD

FINAL DEVELOPMENT

TYPICAL HILLY SITE

FIGURE III - 5

Filling should start near the upper end of the gully and be worked down some convenient distance. The second lift should be filled on the top of the first, and the third on top of the second in a manner similar to the filling of the flat site. Filling from the upper end of the gully allows surface water in the form of rain or snow to drain away from the fill. This is a very important feature which must be followed in this type of an operation. When necessary, the filling can resume at the first level and be continued for another distance to give working and maneuvering room on the second and higher lifts. The process of extending the lowest lifts and then extending each higher lift should be repeated until the final contour or top of the completed fill is reached.

F. FINAL USE AND INTERIM USE OF SANITARY LANDFILL SITES

Once completely filled, sanitary landfill sites can be used for a variety of purposes. It is necessary to understand the nature of a fill site when planning its use. The sites will settle over a period of time; therefore, improvements built upon solid waste fills must be either compatible with the settlement or the foundations must penetrate the fill into firm ground below the fill. Many structures have been successfully built on fills using light buildings and floating foundations, and many heavy structures have been built on piles penetrating through the fill.

The landfills will produce some gasses, normally methane, due to the biological decomposition of the organic material in the fill. These gasses under certain conditions are toxic and explosive. Normal landfill conditions permit harmless concentrations of these gasses to escape to the atmosphere. Many structures and other improvements have been successfully constructed on sanitary landfill sites where the problem of gasses has been properly provided for.

Generally, completed landfills have been used for open space purposes such as parks, golf courses, and recreation areas.

Normal improvements associated with these uses such as pavements, shelter houses, etc., can be designed for landfills. Landfill sites can and have been used for agricultural purposes after completion.

A well-planned arboretum could be a pleasing and interesting addition to a community, especially in the future after many forrested areas may possibly disappear. A landfill site, if properly handled, could be well suited to this use.

The interim use of sanitary landfill sites could be anything of a temporary nature compatible with the landfilling and with activities and land use in the surrounding area. A large site such as the one recommended in the area of Lake Manawa would have approximately half of its area or 240 acres available for other uses for about 10 years.

Planners in the community are cautioned to take special notice of the rate of completion of finished filled land. When a landfill is conducted using only one or two lifts, the rate of completion of filled land is greater than the landfills contemplated in this report, where more lifts are contemplated. They may wish to concentrate efforts on the land not being filled for the first 10 years, and then devote their efforts toward use of completed portions.

PART FOUR - ORGANIZATION FOR SOLID WASTE DISPOSAL

A. GENERAL. The recommended organizational structure for the disposal of solid waste is a single, non-profit, public agency. This agency would be formed for the purpose of operating and/or managing all public solid waste disposal facilities in the three county MAPA area, as one coordinated activity, in accordance with a master plan for area-wide solid waste disposal. It would operate for and on behalf of all of the member municipalities for their mutual benefit.

Each member would agree to the master plan and pass any ordinances or regulations necessary to implement the plan and to grant to the agency exclusive operating authority within their jurisdiction.

Fees would be charged at all agency facilities, for disposal services. These fees would be uniform at all facilities, non-discriminating, and adequate in amount to produce the necessary revenue to make the entire disposal operations self-supporting.

The purchase of land, capital improvements to the land and initial complement of equipment would be paid for with the proceeds of revenue bond issues. The user fees would pay for the bond debt service, debt service reserve, operation and maintenance, equipment replacement, site improvements, miscellaneous and incidental expenses, management and overhead.

B. COLLECTION OF SOLID WASTE. In following paragraphs of this Part of the Report, the legal status of the agency is described and a suggested form of agreement to create the agency is presented. This agreement includes the necessary authority for the agency to enter the field of solid waste disposal. It also includes authority to provide solid waste collection services. The collection services contemplated at this time are minor in nature and are restricted to the rural communities in eastern Pottawattamie County, where some form of formal collection service will be desirable to make a single remote sanitary landfill site economical. This was discussed in Part III of this report.

The scope of this report is limited to disposal problems and specifically excludes collection matters; however some discussion of collection of rural communities waste was necessary and therefore included. The Agency probably will wish to study collection problems in the future and it is likely they will find that great savings can be made by organizing an area wide collection service. For this reason the Intergovernmental Agreement (Document IV-1) creating the recommended Agency includes the power to collect and dispose of solid waste, should the Board wish to include collection service.

C. LEGAL STATUS OF THE AGENCY. The Agency may be formed under provisions of Chapter 28E of the Code of Iowa entitled "Joint Exercise of Governmental Powers" and provisions of Chapter 23, Article 22 of the Statutes of Nebraska entitled "Interlocal Cooperation Act."

DOCUMENT IV - 1, Page 1

INTERGOVERNMENTAL AGREEMENT CREATING THE OMAHA-COUNCIL BLUFFS METROPOLITAN AREA SOLID WASTE AGENCY

By virtue of this agreement made and entered into by the undersigned, there is hereby formed the Omaha - Council Bluffs Metropolitan Area Solid Waste Agency, hereinafter called the Agency, consisting of the elected representatives of the governing bodies of certain cities, towns, villages and counties in the Omaha - Council Bluffs Metropolitan area of Iowa and Nebraska. The cities, towns, villages and unorganized portion of the counties are hereinafter called Municipalities.

WITNESSETH:

I

AUTHORITY

The Municipalities enter into this agreement under and by virtue of the power to do so granted by Chapter 28E, Code of Iowa, 1966; and by Sections 23-2201 thru 23-2207, Revised Statutes of Nebraska 1965.

II

PURPOSES

The purposes of the Agency are as follows:

1. To provide for the economic and sanitary collection and/or disposal of solid wastes produced or generated within each member municipality.
2. To cooperate with local, State and Federal public health agencies in preventing the contamination and pollution of the land, water and air resources of the area, through the control, collection and disposal of solid waste.
3. To engage such employees and provide offices, equipment, machinery, buildings and grounds as are necessary to adequately perform the functions of the Agency.
4. To contract with member cities, towns, villages and counties and with public or private persons, firms or corporations for the collection and/or disposal of solid waste, and collect payment for such services, and to receive and expend State, Federal and private grants and other monies which may be made available, to the extent permissible under applicable State and Federal laws, and under the rules hereinafter set forth.

III

ORGANIZATION

1. Membership in the Agency shall consist of a representative from each participating mu or his designated substitute, which substitute shall be approved by the body he represe The representative shall be an elected official of the municipality he represents. Each pating municipality shall have one vote for each 50,000 population or fraction thereof, residing in the governmental jurisdiction he represents. Such population shall be ascertained from the most recent Federal Census for that jurisdiction.
2. The governing body shall be designated the Agency Board, hereinafter called the "Board", consisting of the member representative from each city with a population of 20,000 or greater; the member representative of each county; and one additional member representative from each county who shall represent all of the incorporated cities, towns, or villages in that county not individually represented on the Board.
3. Each member of the Board shall have one vote for each 50,000 population or fraction thereof, residing in the government jurisdiction he represents. Such population shall be ascertained from the most recent Federal Census for that jurisdiction.

4. A quorum shall consist of a majority of the entire Board membership, regardless of the number of votes held by each member present.

5. The Chairman and the Vice-Chairman of the Board shall be elected by majority of Board membership and shall serve for a term of one year or until their respective successors in office are chosen. The incumbent in each said office may succeed himself.

6. The Board shall hold at least one meeting during each quarter of the year on dates and at places which shall be determined by the Board. Special meetings may be held at the call of the Chairman, Vice-Chairman or majority of the membership of the Board.

7. The Board shall hire a Director and such other supervisory, clerical, and other personnel as are necessary to carry out the functions of the Agency. The Board shall fix their compensation and benefits, and shall approve all personnel rules and regulations pertaining thereto.

8. The Director shall be the Secretary and Treasurer of the Agency and shall have the authority, duties and obligations normally associated with these offices, including but not limited to the receipt and disbursement of funds and the preparation and submission of quarterly and annual financial reports to the Board.

9. The Board may employ legal counsel, who may be a paid employee of one of the members, and who may receive compensation set by the Board for the performance of his duties.

10. A meeting of the entire Agency membership shall be held annually at a time and place determined by the Board and at such other times as the Board may direct or when there is a call for a meeting by a majority of the membership.

    The Chairman and Vice Chairman of the Board shall be the Chairman and Vice Chairman of all Agency membership meetings.

11. The Board shall prepare and present to the Membership for approval the "By Laws of the Agency". A 3/4 vote shall be required for approval. The Board or the membership may, present, at any meeting, amendments to the By-laws. A 3/4 vote of the membership shall be required for approval of changes to the By-Laws.

IV

DURATION

1. It is the intention of this agreement that the Agency be a permanent organization. Additional municipalities may be added to the membership of the Agency upon a three-fourths vote of all of the members of the Board.

2. In the event an additional municipality shall apply for membership in the Agency and said application is considered and approved by the then existing Board, then said municipality may be added to the membership, provided that said additional municipality as a condition of membership agrees to abide by the terms of this agreement as set out herein and possess legal power and authority to do so.

V

POWERS

The Municipalities delegate the following powers to the Agency and Board:

1. To provide solid waste disposal facilities and service for all member municipalities and the public within the general geographic area of the member Municipalities.

2. To provide solid waste collection and disposal service to those member municipalities requesting such service, within the limits authorized by law.

3. To receive funds from member Municipalities as payment for providing collection and disposal service. However, in lieu of receiving such funds from member municipalities, it shall have the power to bill individuals directly for payment for collection and disposal services and to receive such payments, for and on behalf of the municipalities where such direct charging of fees is authorized by law, and where the member requests such billing.

4. To contract with all levels of government, other public agencies, private agencies and private individuals, toward the accomplishment of the stated purposes of the Agency, within the limits authorized by law.

5. To establish a schedule of fees to be collected from all users of the Agency's disposal facilities, provided however the schedule of fees shall be uniform to all users.

6. To hire employees, fix their compensation, benefits, personnel rules and regulations, and terminate their employment.

7. To purchase, lease, receive as gifts or donations, or otherwise acquire all land, buildings, equipment and supplies as necessary to carry out the functions of the Agency, and to dispose of the same.

8. To make or cause to be made studies and surveys necessary to carry out the functions of the Agency.

9. To contract with and compensate consultants for professional services including but not limited to architects, engineers, planners, lawyers, accountants, rate specialists, and all others found necessary to the stated purposes of the Agency.

10. To issue revenue bonds for the purchase of land and equipment and erection of buildings and other improvements, and to provide for their retirement, within the limits authorized by law.

11. To prepare and recommend to member Municipalities local ordinances governing refuse storage, collection, transportation and disposal, regulation of private collection haulers, land use regulations, sanitation, burning of private or public wastes, incineration standards and such other regulations as may from time to time be required.

12. To exercise any and all powers relative to the efficient collection and disposal of solid waste available under then existing laws to each member Municipality.

13. To prepare by-laws, rules and regulations, fee schedules, and entrance and termination forms and procedures for membership in the Agency.

14. To provide for a system of budgeting, accounting, auditing and reporting of all Agency funds and transactions, for a depository, and for the bonding of employees.

15. To consult with representatives of Federal, State and local agencies, departments and their officers and employees and to contract with such agencies and departments.

16. To accept gifts, grants, or loans of money or other property from the United States, the states or any person, corporation or other entity for Agency purposes, and to enter into any agreement required in connection therewith, and to hold, use, and dispose of such money or property in accordance with the terms of the gift, grant, loan or agreement relating thereto.

17. To exercise any and all other powers consistent with the stated purposes of the Agency available under then existing law to each member Municipality.

VI.

TECHNICAL COOPERATION FROM MUNICIPALITIES

The Municipalities agree to respond to reasonable requests to make local records available to the Agency staff and its consultants or employees for the purposes of this agreement, and to assure that engineers, architects and consultants hired by the Municipalities release materials, data and other pertinent items paid for by public funds, to the Agency staff to aid in the efficient and effective accomplishment of such purposes

VII.

FINANCING

1. The Board shall prepare a budget based on calendar years for the operation of the Agency to be adopted in June of the year preceding the budget year.

2. The Board shall request each Municipality to provide in its budget for its share of the Agency budget.

3. The Board shall annually adopt a percentage formula, based on population, as shown in the last completed Federal census, for the purpose of allocating the portion of the Agency budget each Municipality will provide.

4. The share of each budget from each Municipality shall be due and payable to the Treasurer of the Agency in quarterly payments to be made within 30 days after the beginning of the quarter of the Agency's budget year.

5. Special appropriations shall be made by the parties hereto for funding the operation of the Agency prior to the establishment of the budget cycle.

6. Any special or budgetary appropriation adopted by the Agency shall be a membership requirement of each and every Municipality and shall upon the Municipality's contracting with the Agency therefore constitute a legal liability on the part of such Municipality. The failure of a Municipality to pay over to the Agency the allotted share of an Agency budget may be considered a momentary withdrawal of that Municipality and a default of this Agreement.

VIII.

SUSPENSION OF VOTING RIGHTS AND SERVICES

During a period of delinquency by a Municipality in the payment to the Agency of its share of a budget and before such delinquency is determined a voluntary withdrawal, such Municipality shall not be entitled to the services of the Agency, nor shall the Municipality be entitled to vote on matters coming before the Board, unless such delinquency shall be waived for voting purposes by a three-quarters vote of the remaining members of the Board.

IX

DISSOLUTION

1. In the event of the withdrawal of any Municipality from the Agency such withdrawing Municipality shall be entitled to a pro-rata share of the value of the real and personal property of the Agency. Such share shall be calculated as the percentage of the then value of said property based on the ratio of the funds the withdrawing Municipality has provided to the Agency during the period of this agreement to the sum of all funds provided by all Municipalities. Funds for the payment of the pro-rata share of such property value shall be provided for in the next succeeding Agency budget cycle and shall be payable within six months of the beginning of the budget year in which the item appears. A withdrawing Municipality may waive its pro-rata share of any real or personal property in the possession of the Agency.

2. The Agency shall be completely dissolved and this agreement terminated only upon the affirmative three-quarters majority vote of the Board.

3. In the event of complete dissolution of the Agency, any real or personal property shall be sold and the proceeds prorated among the Municipalities at the time of dissolution on the basis of the sum of the portions of the budget for the Agency provided by them for and during the period of this agreement. The current budget year shall be used as one of the years in the calculation if all Municipalities have made their proper contribution. If all members have not made their proper contribution, the balance remaining of funds collected during the current year shall be refunded to the contributors before determining the value of the assets of the Agency at dissolution, and said year shall not be used in calculating the shares.

4. In the event the Agency has acquired a debt thru the issuance of bonds or loans or otherwise, and such debt is still outstanding, and unpaid, no member may withdraw or in any way terminate, amend, or modify this agreement in any manner to the detriment of the bond holders or holders of notes or other instruments of debt.

X.

MANNER OF ACQUIRING AND HOLDING PROPERTY

1. The Board may lease, purchase, or acquire by any other means, from members or from any other source, such real and personal property as is required for the operation of the Agency and the carrying out of the purposes of this agreement. The Board shall maintain title to all such property in the name of the Agency and shall require the Secretary to maintain an inventory. Property, materials and services shall be acquired or disposed of only upon a majority vote of a quorum attending a duly called Board meeting, provided however, that by the same vote, the Board may authorize the Director to expend such funds as the Board may direct for other authorized purposes of the Agency.

These two state provisions are similar to the typical Joint Powers Act found in many state codes. They provide, in part, that any governmental subdivision may cooperate or contract with another subdivision, or jointly perform any service or exercise any power which they individually have the power to do; or they may form a separate agency for this purpose. These same two legislative provisions are the legal basis upon which the Omaha-Council Bluffs Metropolitan Area Planning Agency was formed.

A proposed form of an intergovernmental agreement to create and operate the agency is included in this Part IV of the report as Document IV-1.

This agreement is applicable to cities, towns and counties in Iowa and cities, villages and counties in Nebraska. Hereinafter cities, towns, villages and counties are referred to as "Municipalities".

D. MEMBERSHIP. It is essential to the plan, as proposed, that the political jurisdictions in which sanitary landfill sites are located be members of the agency. This includes Council Bluffs, Omaha, and the counties of Pottawattamie, Douglas and Sarpy. It would be desirable if all of the municipalities in the Study Area executed the agreement.

E. FORMATION OF THE AGENCY. It is recommended that the Agency be established as an independent entity, whose membership would be comprised of one representative from each participating municipality. The representative would be one of the elected officials of the municipality. The Agency would be governed by a Board of Directors comprised of the representative of the major cities; the counties; and 3 additional representatives, each of which would represent the smaller cities, towns or villages in each of the three counties. In voting matters concerning the entire Agency and/or the Board, each representative shall have one vote for each 50,000 population or fraction thereof residing in the jurisdiction he represents.

With the membership consisting of elected representatives, direct lines of communication between the Agency and the municipalities is established and the following benefits realized;

1. The Agency would function with real authority since individual members would be an elected official who would represent and speak directly for his respective city, town and village councils, and county boards.

2. Feedback to the member jurisdictions would be accomplished by having direct representation on the Board.

3. Limiting the Board membership in the manner described would prevent the membership of the Board from becoming too large to function effectively as a policy making body.

4. Weighing the vote of each member on a population basis would provide a fair method of recognizing the population differences between the member jurisdictions.

The length of the term of membership on the Board should be determined when the By-Laws for the Board are initially drawn up. Provisions should be made to assure continuity on the Board, taking into account the variations in the ordinances of the member jurisdictions regarding length of office of elected officials.

The broad purposes of the Agency as outlined in the proposed Agreement are as follows:

1. To provide for the efficient and economical, collection and disposal of solid waste produced or generated within the Study Area.

2. To promote through good practice, effective means for reducing or preventing the contamination and pollution of the land, water and air resources of the Study Area.

3. To provide for a self-supporting, independent organization, equipped with sufficient manpower and facilities to adequately perform the purpose of the Agency.

A proposed organizational chart for the Agency is shown on Figure IV-1. This chart indicates the flow of authority from the elected municipal and county officials, to the Agency Board and the Director.

The director would be responsible for the administration and operation of the Agency, under policies adopted by the Board. This is a top level position requiring experience in public works management, personnel management, engineering and public financing.

The assistant director should have qualifications similar to that of the director.

Professional staff services such as legal, engineering, planning and research could be provided by full time employees or by consultants. This determination should be made by the Board and the director in the development of the work program for the Agency. The Agency may be able to utilize personnel employed by member communities for these specialized services.

It is believed that the majority of jobs in the collection and disposal divisions can be filled by absorbing qualified personnel from existing municipal refuse agencies. Provisions should be made to guarantee that transferring employees retain their basic job benefits, including seniority, vacation accruals and retirement credits.

In-service training programs should be established, particularly in the refuse disposal division, to adequately train personnel at the several landfill sites in the methods and procedures recommended in Part III of this report.

F. OPERATION OF THE AGENCY. It is proposed that the Agency be operated in a manner similar to a public utility, responsible to the Agency Board rather than any one municipality or county. It should have authority

PROPOSED ORGANIZATIONAL STRUCTURE FOR THE AGENCY - 1969

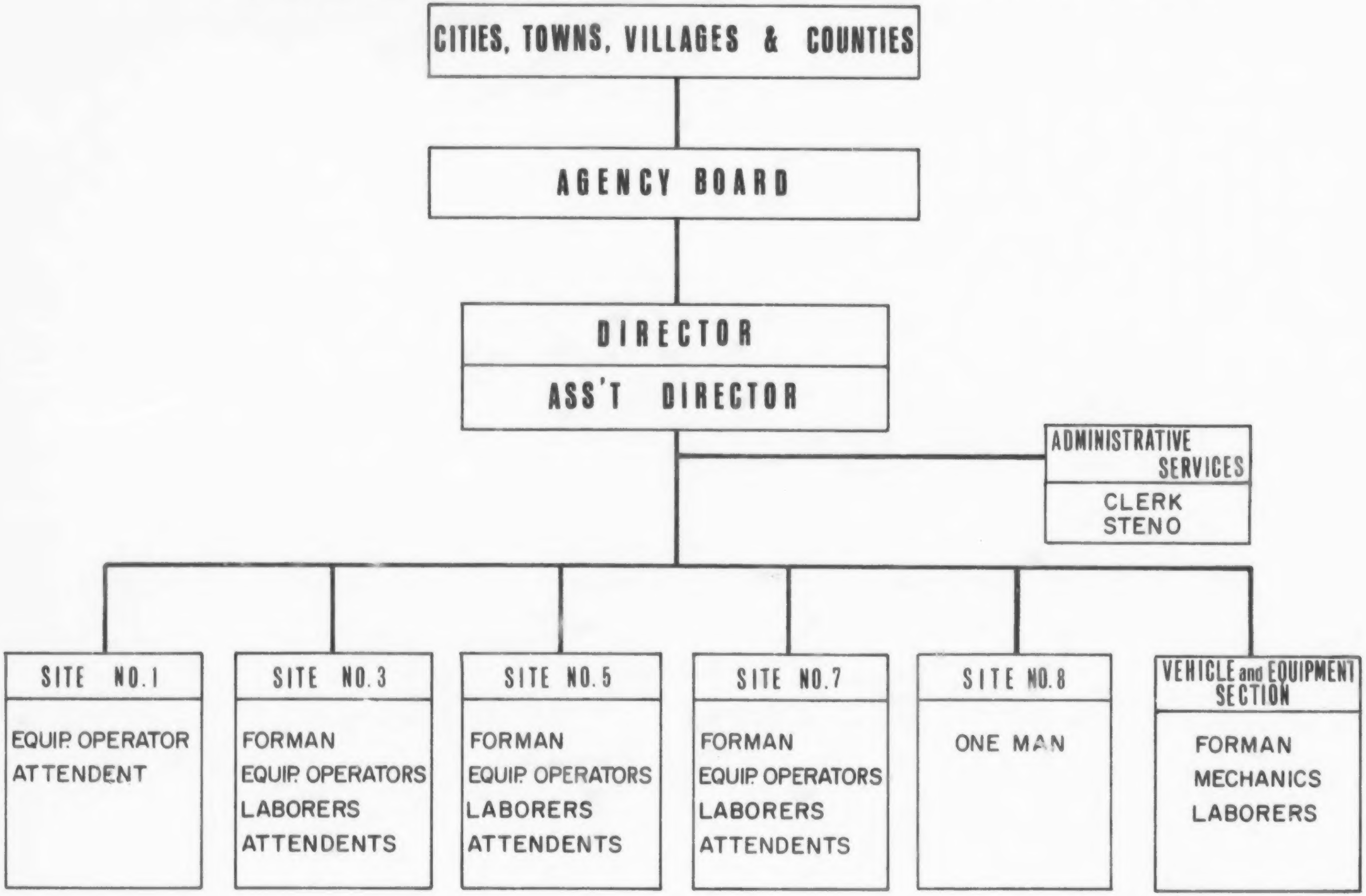

CITIES, TOWNS, VILLAGES & COUNTIES
AGENCY BOARD
DIRECTOR
ASS'T DIRECTOR
ADMINISTRATIVE SERVICES
CLERK
STENO
SITE NO.1
EQUIP. OPERATOR
ATTENDENT
SITE NO.3
FORMAN
EQUIP. OPERATORS
LABORERS
ATTENDENTS
SITE NO.5
FORMAN
EQUIP. OPERATORS
LABORERS
ATTENDENTS
SITE NO.7
FORMAN
EQUIP. OPERATORS
LABORERS
ATTENDENTS
SITE NO.8
ONE MAN
VEHICLE and EQUIPMENT SECTION
FORMAN
MECHANICS
LABORERS

FIGURE IV - 1

to operate independently of city limits, county or state lines provided the city, county or state is an Agency member.

The Agency will be able to function most efficiently and economically if all jurisdictions in the Study Area are participating members. However, this is not an absolute necessity. It is possible, economically and politically, to form the Agency, as it is contemplated in these recommendations, if only Omaha, Council Bluffs, and the three counties of Pottawattamie, Sarpy and Douglas join. These are the major jurisdictions and the jurisdictions in which sanitary landfill sites are located.

Basically, the Agency will provide two types of service for the area; refuse disposal and refuse collection, as follows:

1. Refuse disposal - Five Agency owned or leased, managed and operated landfill sites will be open to anyone wishing to dispose of solid waste. The description and location and operation of the landfill sites have previously been discussed in Part III. All vehicles other than automobiles will be charged a disposal fee, based upon the amount of refuse delivered. It is recommended that private individuals using automobiles be allowed to use the landfill sites without charge. A proposed disposal ordinance has been prepared and is included in this part of the report as Document IV-2.

2. Refuse Collection - In rural Pottawattamie County, one central sanitary landfill is recommended. To be economical some form of cooperative collection service should be organized. See Part III for discussion of this service.

In the event the Agency wishes to provide limited collection service at this time and expanded service sometime in the future, the Agency may contract with each member jurisdiction requesting this service, to provide refuse collection service. The contract would include the method of determining the actual cost, the type of service, frequency of service and other related items. It is recommended that each member jurisdiction adopt a refuse collection ordinance, consistent with collection requirements of the Agency. A proposed collection ordinance has been prepared and is included in this part of the report as Document IV-3.

Initially, a problem would exist in providing collection service in the unincorporated areas of the counties. Statutory authority for county refuse collection is presently not available. It is recommended that county officials request such legislation during the next session of the legislature. Until such legislation is available, it is believed that collection service can be provided to most unincorporated areas on a voluntary basis.

G. FINANCING.

1. Disposal Service.

a. Revenue Bonds. Initial capital investments and annual operating revenue will be required for disposal service. It is recommended that the initial capital investments be financed through revenue bonds. The

PROPOSED REFUSE DISPOSAL ORDINANCE FOR CITIES CONTRACTING WITH THE OMAHA-COUNCIL BLUFFS METROPOLITAN AREA SOLID WASTE AGENCY

Ordinance No._____

AN ORDINANCE PROVIDING FOR MUNICIPAL DISPOSAL OF GARBAGE AND REFUSE; DEFINING TERMS; PRESCRIBING RULES AND REGULATIONS THEREFOR; REGULATING THE PRIVATE DISPOSAL OF GARBAGE AND REFUSE; PROVIDING FOR THE LICENSING AND REGULATION OF PRIVATE LANDFILL OPERATORS AND DISPOSAL SITES; PROVIDING PENALTIES FOR VIOLATION THEREOF; AND REPEALING ORDINANCE NO._____ AND ALL OTHER ORDINANCES AND PARTS OF ORDINANCES IN CONFLICT THEREWITH.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF______________________________:

SECTION 1. For the purpose of this Ordinance the following definitions shall apply;

1.1 "Agency" shall mean the Omaha-Council Bluffs Metropolitan Area Solid Waste Agency.

1.2 "Construction Demolition Waste" shall mean waste building materials and rubble resulting from the demolition of building structures, pavements and other physical facilities.

1.3 "Garbage" shall mean the solid or semi-solid animal and vegetable waste resulting from the handling, preparation, cooking and serving of foods, including cans, bottles and cartons in which it was received and wrappings in which it may be placed for disposal.

1.4 "Person" shall mean any individual, firm, association, syndicate, co-partnership, corporation, trust, other legal entity having proprietary interest in a premise, or other legal entity having responsibility for an act.

1.5 "Health Officer" shall mean (each City, Town, Village and County should indicate who shall be the Health Officer who shall have responsibility for administering and enforcing this ordinance).

1.6 "Sanitary Landfill" shall mean a controlled method of disposing of refuse on land without creating air, land or water pollution or nuisances or hazards to public health or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical volume, and to cover it with a layer of earth at the conclusion of each day's operation, or at more frequent intervals as may be necessary.

1.7 "Refuse" shall mean unwanted or discarded material resulting from commercial, industrial and agricultural operations and from normal community activities. Waste refuse includes in part the following: garbage; rubbish; ashes and other residue after burning; street refuse; dead animals; animal waste; abandoned vehicles; agricultural, commercial and industrial waste; construction and demolition waste and sewage treatment residue.

SECTION 2. By virtue of an agreement dated___________between the City and the Agency, the Agency has agreed to provide and operate sanitary landfill facilities for and on behalf of the City, for the disposal of refuse originating within the jurisdiction of the City.

The sanitary landfill facilities operated by the Agency are hereby designated as the official "Public Sanitary Landfill" for the disposal of solid waste originating within the jurisdiction of the City. No other Public Sanitary Landfills are authorized; provided however, any publicly operated facilities or privately operated facilities open to the public, which are in existence and operating at the time of the effective date of this ordinance may continue to operate until one year after the effective date of this ordinance.

The Agency is authorized to establish such rules and regulations as may be reasonable and necessary for the proper operation of the facilities and to modify or amend or extend such rules and regulations as may be required from time to time.

The Agency is authorized to establish a schedule of fees to be paid by the users of the facilities, to cover the cost of owning and operating such facilities and other expense directly related to said facilities; provided however, said schedule of fees shall be nondiscriminating and shall apply equally to all users.

SECTION 3. All sanitary landfills within the jurisdiction of the City shall be operated in a sanitary, safe and nuisance free manner, and shall comply with all local, state and federal laws and regulations. In addition to other laws or regulations which may be required the following standards shall apply:

SANITARY LANDFILL STANDARDS

3.1 Zoning. Sanitary landfills shall be located only in areas zoned to permit such land use.

3.2 Flooding. Sanitary landfills shall be located in places not subject to overflow of streams, rivers, or water courses; or shall be suitably protected by levees or other control devices to prevent overflow. The 50 year flood shall be used for design purposes in Urban Areas and the 20 year flood in Rural Areas.

3.3 Sight Screening. The site operations shall be suitably screened by fences, earthen berms, natural barriers or landscaping, from view from any ground level point outside the site area that is within 1320 feet of the filling operation.

3.4 On-Site Access Roads. Access roads shall be provided on the premises of the site which are readily negotiable by heavy and light vehicles during wet weather.

3.5 Off-Site Access Roads. Access roads leading to the site shall be all weather roads adequate to carry the expected traffic.

3.6 Personnel Shelter. Suitable shelter and sanitary facilities shall be provided for personnel.

3.7 Quantity Measurements. Sites designed for disposal of refuse, at the rate of 100,000 tons per year or greater, shall be equipped with motor truck scales and a record of tonnage of waste disposed of shall be kept. However, the operator may at his option exclude automobiles and/or pickup trucks and other small vehicles from weighing requirements, provided some alternate and suitable form or record of waste delivered in these vehicles is maintained.

Sites designed for disposal of refuse at the rate of less than 100,000 tons per year shall determine the amount of refuse disposed of by weighing of loads or some other suitable method.

All sites shall determine the volume of material filled by physical survey at time increments not to exceed each 6 months.

3.8 Controlled Access. Access to the fill areas shall be limited to those times when an attendant is on duty. Positive means shall be provided to limit the access thru the use of fence, gates, natural barriers or other suitable means.

3.9 Burning Prohibited. No open burning of any kind shall be permitted at a sanitary landfill site at any time.

3.10 Fire Prevention. Suitable measures shall be taken to prevent accidental fires at site including but not limited to no smoking regulations and regulations prohibiting loads which may be a fire hazard. Regulations shall be posted and enforced.

3.11 Control of Fires. Suitable provision shall be made to control and extinguish fires accidentally started.

A stockpile of cover dirt shall be maintained near the active face to be used to smother fires when necessary. Also water from mains, tanks or ponds, or suitable water wagon shall be available. Buildings and equipment shall be equipped with adequate fire extinguishers.

3.12 Unloading. The unloading of refuse shall be under the general direction of an attendant who shall control the place of deposit.

3.13 Working Face. The working face of the sanitary landfill shall be confined enough to be easily maintained with available equipment.

3.14 Litter. Blowing litter shall be controlled by providing fencing near the working area, and in addition by other fencing, berms, windbreaks, natural barriers or other methods as required to prevent wind blown litter from leaving the working area and the general site area. Unloading shall be coordinated with wind direction to reduce wind blown litter. The entire site shall be kept free of accumulated litter by a combination of prevention and policing.

3.15 Spreading and Compacting. Refuse shall be spread and compacted in shallow layers, not exceeding a depth of two feet of compacted material. Additional layers shall be placed one upon another until the depth of fill has reached a predetermined height for that particular daily lift.

3.16 Daily and Intermediate Cover. A uniform compacted layer of at least 6" of suitable cover material shall be placed on all exposed refuse by the end of each working day. Where a completed lift is to be left for more than 6 months before the application of another lift, the depth of cover requirement shall be increased to a minimum of 12" compacted thickness.

3.17 Final Cover. A layer of suitable cover material compacted to a minimum depth of three feet shall be placed over the entire surface of each portion of the final lift not later than 3 months following the placement of final lift. This final cover shall be fine graded to the grades established for the ultimate use of the site. The graded final cover shall be planted to grass or other suitable ground cover at the earliest reasonable time and watered and maintained to establish an adequate ground cover.

3.18 Maintenance of Equipment. Provisions shall be made for the routine operational maintenance of equipment at the landfill site and for prompt repair or replacement of landfill equipment.

3.19 Special Materials. Special provisions shall be made to handle sewage solids, meat packing industry waste, bulky wastes or other special or hazardous waste, when such wastes are accepted at a sanitary landfill. Provisions shall include established standard operating procedures which shall be known to attendants and posted for public information.

3.20 Vector Control. Conditions unfavorable for the production of insects and rodents shall be maintained at all times. Supplemental vector control measures shall be instituted when necessary.

3.21 Dust Control. Suitable control measures shall be taken to prevent a nuisance from dust.

3.22 Ground Water. Refuse shall not be placed in locations or at elevations where contact with ground water is likely and such contact would result in pollution of ground water supplies or other pollution or nuisance.

3.23 Drainage of Surface Water. The entire site, including the fill surface, shall be graded and/or provided with drainage facilities to minimize run-off into and onto the fill, prevent erosion or washing of the fill, drain off rain or other precipitation falling on the fill, and to prevent the collection of standing water. The final surface of the fill shall be graded to slope at least 1%, but no slope shall be so steep as to cause erosion of the cover.

3.24 Animal Feeding. All animals shall be excluded from the site.

3.25 Salvage. No salvaging or scavenging shall be permitted at the site.

3.26 Safety. Site personnel shall be instructed in the principals of first aid and safety and in the specific operational procedures necessary to prevent accidents. Accident precautionary measures shall be employed at the site. An adequate stock of first aid supplies shall be maintained at the site.

3.27 Communications. Telephone or radio communication shall be provided at or near the sanitary landfill site.

3.28 Initial Development of Site. Prior to filling any waste, the initial development of the site must have been completed. Initial development shall include the following: roads, grading, drainage, utilities, structures, fencing, berms, sight screening and litter control fencing. During the first planting season initial landscaping and ground cover shall be established.

3.29 Operational Plan. Prior to filling any waste, an operational plan must be prepared. This plan shall show the intended filling of the site and shall include layout and elevation of lifts, sequences, sources and quantities of cover material, drainage, temporary roads and final development of the site.

3.30 Operational Records and Plan Execution. A daily log shall be maintained showing location, type and quantity of material being placed in the fill. A copy of the plan, specifications, instructions and other documents showing how the filling is to be carried out shall be maintained at the site. Lines, grades, and other control devices shall be placed in the fill area prior to filling and shall be maintained as required to provide a visual reference for equipment operators.

SECTION 4. Any person may establish and operate a private sanitary landfill for the disposal of his own solid wastes provided he shall have first applied for and received a permit from the city designating his site a "Licensed Private Sanitary Landfill" and may continue to do so as long as the permit shall remain in force and the site is operated in accordance with the provisions of this ordinance.

Licensed Private Sanitary Landfill sites shall be used for the exclusive purpose of disposing of the site operator's own waste and shall not be open to any segment of the general public nor to any other private source of waste.

It shall be unlawful for any person to receive payment of any kind, or request payment of any kind, for the disposal of any garbage or refuse at a private licensed sanitary landfill site. The charging of a fee for the collection and disposal of any garbage or refuse from a customer by a private refuse collector shall not be construed as a violation of this Section since the disposal is considered to be incidental to the total collection and disposal service, provided however, such collection and disposal shall be conducted entirely by forces and with equipment owned or operated by the private refuse collector.

The issue of this permit shall be in the manner prescribed by the City and subject to all other applicable Ordinances of the City. Application permits shall include all necessary data to show that the landfill will be operated in accordance with the Sanitary Landfill Standards included in Section 3. Included in part must be: a topographic map of the existing land; preliminary plans of the initial development; preliminary operation plans; sources of cover material; equipment proposed for use and other data as may be required. Also included shall be an agreement by the applicant to maintain his landfill site and the vicinity in a safe and sanitary manner, to allow no public nuisance, and to provide a responsible person who will be in constant attendance during the hours of active operation; agreement to operate his landfill in accordance with all local, county, state and federal regulations and to permit access to [illegible] landfill site by any health officer or governmental representative or agent who may have jurisdiction for the purposes of inspection.

An annual license fee of $300.00 per year shall be paid to the City for each location at which a landfill is conducted.

If any private landfill operation is found to be conducted in a way detrimental to the health and welfare of the public, or contrary to provisions of this ordinance, the Health Officer shall notify the operator in writing of the objectionable conditions and give him a reasonable time to correct said conditions. After proper notice, the City is authorized to enter upon the premises and use any of the City's forces and equipment, or those of the landfill operator, or hire forces and equipment to correct the objectionable conditions. The same shall be considered of benefit to the Owner of the land and the cost of such corrective action shall be chargeable to the Owner, and if not paid, shall constitute a lien upon the premises and shall be collected in the same manner as taxes as provided by law.

SECTION 5. Any person may establish and operate a private landfill for the disposal of "Construction Demolition Waste" originating from the operator's own demolition work, provided he shall have first applied for and received a permit from the City designating his site a "Licensed Private Landfill," and may do so as long as the permit shall remain in force and the site is operated in accordance with the provisions of this Ordinance.

Licensed Private Landfill sites shall be used for the exclusive purpose of disposing of the site operator's own waste and shall not be open to any segment of the general public nor to any other private source of waste.

It shall be unlawful for any person to receive payment of any kind or request payment of any kind for the disposal of any construction demolition waste at a Private Landfill site. The charging of a fee for demolition and disposal of a structure or pavement or other physical facility shall not be considered as a violation of this section since the disposal is considered to be incidental to such demolition and disposal service provided demolition and disposal shall be conducted entirely by forces and with equipment owned or operated by the site operator.

The issuance of this permit shall be in a manner prescribed by the City and subject to all other applicable Ordinances of the City.

Applications for permits shall include all necessary data to show that the landfill will be operated in accordance with the Sanitary Landfill Standandards included in Section 3 except the provision for On-Site Roads, Quantity Measurements, Unloading, Daily & Intermediate Cover, Special Materials, Animal Feeding, and Operation Records and Plan Execution shall not be required.

In lieu of the daily and Intermediate Cover requirements as written, the operator shall be required to comply with this standard only for that part of the material which is combustible or which is subject to being scattered by the wind causing wind blown litter.

Included in part must be: a topographic map of the existing land; preliminary plan for the initial development; preliminary operation plans; sources of cover material; equipment proposed for use and other data as may be required. Also included shall be an agreement by the applicant to maintain his landfill site and the vicinity in a safe and sanitary manner, to allow no public nuisance, and to provide a responsible person who will be in constant attendance during the hours of active operation; agreement to operate his landfill in accordance with all local, county, state and federal regulations and to permit access to the landfill site by any health officer or governmental representative or agent who may have jurisdiction for the purposes of inspection.

An annual license fee of $300.00 per year shall be paid to the City for each location at which a landfill is conducted.

If any private landfill operation is found to be conducted in a way detrimental to the health and welfare of the public, or contrary to provisions of this ordinance, the Health Officer shall notify the operator in writing of the objectionable conditions and give him a reasonable time to correct said conditions. After proper notice, the City is authorized to enter upon the premises and use any of the City's forces and equipment, or those of the landfill operator, or hire forces and equipment, to correct the objectionable conditions. The same shall be considered of benefit to the Owner of the land and the cost of such corrective action shall be chargeable to the Owner, and if not paid, shall constitute a lien upon the premises and shall be collected in the same manner as taxes as provided by law.

SECTION 6. No person shall dispose of garbage or refuse of any kind upon any land within the jurisdiction of the City, except as provided in Section 5, unless such land has been designated by the City as a "Licensed Private Sanitary Landfill" or a "Public Sanitary Landfill" and then only in compliance with posted or published instructions or at the direction of an attendant in charge.

SECTION 7. Nothing in this ordinance shall apply to the filling, leveling or grading of land with earth, sand, ashes, cinders, slag, gravel, rock, or similar inert wastes, provided these materials are not contaminated or mixed with other waste materials; nor to the disposal of animal and agricultural wastes on farm land.

SECTION 8. It shall be unlawful for any person, firm or corporation to sell or offer for sale, or to install or offer to install, any device intended for use as a garbage or refuse burner or incinerator; except when the intended user of such a device has secured a license to operate such a device from the City, or when the device will be operated by or for the City.

SECTION 9. It shall be unlawful for any person to burn or incinerate or permit the burning or incineration of any garbage or refuse within the jurisdiction of the City. This section shall apply to all garbage and refuse as defined, and shall specifically include all waste paper, boxes, market waste, garden wastes, trees, tree limbs, leaves and any and all materials other than materials used as a fuel in a furnace or boiler.

This section shall not apply to any incinerator operated under a license granted by the City or any incinerator operated by or for the City, or any burning conducted under the direction of the Fire Department of the City.

SECTION 10. It shall be the duty of the Health Officer and all police officers of the City to enforce the provisions of this ordinance.

SECTION 11. Ordinance No._____ and all ordinances or parts of ordinances in conflict with this ordinance are hereby repealed.

SECTION 12. If any section, subsection, sentence or part of this ordinance is for any reason held to be invalid or unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance.

SECTION 13. Any person violating any of the provisions of this ordinance shall upon conviction be subject to a fine of not more than $100.00 or to imprisonment for not more than 30 days.

SECTION 14. This Ordinance shall be in full force and effect from and after its passage and publication as provided by law.

PASSED AND APPROVED this_______day of____________________________, 19______

____
Mayor

Attest:

____
City Clerk

PROPOSED REFUSE COLLECTION ORDINANCE FOR CITIES, TOWNS AND VILLAGES CONTRACTING WITH THE OMAHA-COUNCIL BLUFFS METROPOLITAN SOLID WASTE AGENCY

Ordinance No. ____

AN ORDINANCE PROVIDING FOR MUNICIPAL COLLECTION OF GARBAGE AND REFUSE; DEFINING TERMS: PRESCRIBING RULES AND REGULATIONS THEREFOR; REGULATING THE PRIVATE COLLECTION OF GARBAGE AND REFUSE; PROVIDING FOR THE LICENSING AND REGULATION OF PRIVATE GARBAGE AND REFUSE COLLECTORS; PRESCRIBING RULES AND REGULATIONS FOR HAULING GARBAGE, REFUSE AND OTHER WASTE MATERIALS WITHIN OR THROUGH THE CITY; PROHIBITING THE DEPOSIT OF LITTER WITHIN THE CITY; PROVIDING PENALTIES FOR VIOLATION THEREOF; AND REPEALING ORDINANCE NO. ________ AND ALL OTHER ORDINANCES AND PARTS OF ORDINANCES IN CONFLICT THEREWITH.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ______________________.

SECTION 1: For the purpose of this Ordinance the following definitions shall apply:

1.1 "Agency" shall mean the Omaha-Council Bluffs Metropolitan Area Solid Waste Agency.

1.2 "Person" shall mean any individual, firm, association, syndicate, co-partnership, corporation, trust, other legal entity having proprietary interest in a premise, or other legal entity having responsibility for an act.

1.3 "Garbage" shall mean the solid or semi-solid animal and vegetable waste resulting from the handling, preparation, cooling and serving of foods, including cans, bottles and cartons in which it was received and wrappings in which it may be placed for disposal.

1.4 "Refuse" shall mean all solid waste from residential, commercial or industrial premises. It shall include semi-liquid or wet wastes with insufficient moisture and other liquid contents to be free flowing. It shall not include any construction materials except minor amounts incidental to other wastes.

1.5 "Health Office" shall mean (each city, Town, Village and County should indicate who shall be the Health Officer, who shall have responsibility for administering and enforcing this ordinance.)

SECTION 2: By virtue of an agreement dated __________ between the City and the Agency, the Agency has agreed to provide garbage and refuse collection and disposal service for and on behalf of the City, to remove all garbage and refuse from (specify who is to receive service; i.e., dwellings, commercial, etc.) located within the City, subject to the following conditions:

2.1 Collections shall be made not less than (specify number of times per week) a week, at such time and in such areas of the City as shall be set out in schedules agreed upon by the City and the Agency.

2.2 The City and the Agency are authorized and empowered, jointly, to change or amend such schedules from time to time as they, in their discretion, shall deem necessary.

2.3 Collections may be made either from streets or alleys, where existing, at the discretion of the Agency personnel.

2.4 Containers shall be placed out-of-doors at some easily accessible place.

2.5 (Specify other conditions as necessary.)

SECTION 3. Refuse containers and garbage containers shall not be more than 30 gallons nor less than 10 gallons in nominal capacity; except where only one container is used, in which case this containers may be less than 10 gallons in capacity. Containers shall be waterproof, rat proof, and fitted with a tight lid. The containers shall have handles, bails or other suitable lifting devices or features. The containers shall be of a type originally manufactured for refuse or garbage, with tapered sides for easy emptying. They shall be of light weight and sturdy construction. The weight of any individual container and contents shall not exceed 65 pounds. Galvanized iron and similar metal containers, rubber or fiberglass containers, and plastic containers which do not become brittle in cold weather may be used. Disposable bags manufactured for garbage and refuse disposal in suitable frames or containers shall be acceptable. Oil or grease drums, paint cans, and similar salvaged containers shall not be acceptable.

3.1 All refuse and garbage shall be placed in suitable containers; except, it shall not be necessary to place books, boxes, magazines, or newspapers in containers provided they are securely tied in bundles or completely contained in disposable boxes not larger than 24 x 24 x 36 inches. Also tree limbs and brush may be securely tied in bundles not larger than 48 inches long and 18 inches in diameter.

3.2 Baskets, boxes and non-complying refuse or garbage cans or containers shall be considered disposable refuse and shall be removed by the Agency collection crews if they are the proper size and otherwise acceptable for collection; or shall be left uncollected if they are larger than the allowable size or unacceptable for collection.

3.3 Large bulky items such as furniture, large tree limbs and appliances that cannot be reduced to fit approved containers, will not be collected. (City to specify alternate collection if desired.)

SECTION 4. Within the corporate limits of the City, all garbage or refuse, consisting of waste animal and vegetable matter, which may attract flies, dogs or rodents, shall be drained of all excess liquid, wrapped in paper or disposable containers, and placed or stored, until collected, in covered suitable containers as described in Section 3.

SECTION 5. It shall be unlawful for any person to permit to accumulate on any premises, improved or vacant, or on any public place in the City, such quantities of garbage or refuse, either in containers or not, that shall, in the opinion of the Health Officer, constitute a health or sanitation hazard.

SECTION 6. It shall be unlawful for any person to permit to accumulate quantities of refuse, papers, trash, ashes, or other waste materials, within or close to any building in the City, unless the same is stored in containers in such a manner as not to create a health or fire hazard.

SECTION 7. No person shall engage in the business of removing or hauling garbage or refuse from the premises of others unless such person shall have first applied for and received a permit to do so from the City. Application for such permit shall specify the equipment or vehicles to be used, general information concerning the route to be traveled and the places to be served, and the name and address of the applicant. Such person shall pay an annual license fee of Fifty Dollars (50.00) per year for each vehicle engaged in such business to be paid at the office of the City Clerk. Such permit fee shall be payable commencing on the ________ day of ________________, 19___, and shall be renewable each year thereafter. All vehicles licensed under this section shall prominently display the license number on the left and right sides of the vehicle in letters not less than 3" high.

SECTION 8. Any person authorized and licensed by the Agency to remove or haul, garbage or refuse, shall be considered to have met the provisions of Section 7, and no further permit or license shall be required by the City.

SECTION 9. No person shall haul any garbage or refuse upon the streets, alleys or public places of the City, unless the same shall be in approved containers, securely fastened to prevent spillage, or in a totally enclosed water tight vehicle. If, however, the material is a dry type material, it may be hauled in a totally enclosed vehicle, or open vehicle which is covered with a suitable tight fitting canvas tarpaulin or similar cover to prevent spillage. Licensed collectors who collect and haul garbage and/or refuse shall haul these materials only in totally enclosed vehicles with water tight containers. All vehicles used for the collection and removal of garbage and refuse shall be kept in a clean, inoffensive and sanitary condition. All garbage and refuse shall be handled in such a way as to prevent the scattering, spilling or leakage of same.

SECTION 10. No person shall haul or cause to be hauled any garbage, refuse or other waste material of any kind, to any dumping place or site or area, within or without the corporate limits of the City, unless such place, site or area is first licensed by the City, or is an Agency operated sanitary landfill site; in addition to complying with all applicable health and zoning ordinances of the City.

SECTION 11. No person shall deposit in a garbage or refuse container or otherwise offer for Agency collection any hazardous garbage, refuse, or waste. Hazardous materials shall be transported by the owner, responsible person or his agent, to a place of safe deposit or disposal as prescribed by the Health Officer or his authorized representative. Hazardous materials shall include: Explosive materials; rags or other waste soaked in volatile and inflammable materials; drugs; poisons; radio active materials, highly combustible materials; soiled dressings, clothing, bedding and/or other wastes, contaminated by infection or contagious disease, and other materials which may present a special hazard to collection or disposal personnel or equipment or to the public.

SECTION 12. No person shall throw, rake, deposit, dump, drop or spill litter, waste material or foreign material upon the streets, sidewalks, or other public rights-of-way within the City. However, the Mayor may at his discretion proclaim a period when leaves may be placed in street right-of-ways for collection.

SECTION 13. It shall be the duty of the Health Officer and all police officers of the City to enforce the provision of this ordinance.

SECTION 14. Ordinance No. __________ and all ordinances or parts of ordinances in conflict with this ordinance are hereby repealed.

SECTION 15. If any section, subsection, sentence or part of this ordinance is for any reason held to be invalid or unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance.

SECTION 16. Any person, firm or corporation violating any of the provisions of this ordinance shall upon conviction be subject to a fine of not more than $100.00 or to imprisonment for not more than 30 days.

SECTION 17. This Ordinance shall be in full force and effect from and after its passage and publication as provided by law.

PASSED AND APPROVED this _________ day of _______________, 19___.

____
Mayor

Attest:

____
City Clerk

required annual operating revenue and debt service on the bonds can be raised from fees charged by the Agency for disposal services rendered to the member communities.

The details of the financing should be worked out by financial consultants at the proper time. In this section, the revenue requirements and the fees necessary to meet these requirements are summarized.

Bond authorities informally doubt that the Agency, created under the provisions of Chapter 28E, Code of Iowa and provisions of Chapter 23, Article 22 of the Statutes of Nebraska would have the specific authority to issue bonds of any kind. Apparently this matter has not been necessary to date nor tested in any court. It would be beneficial if this authority were added to the provisions of the two state laws. Without such specific authority, potential bond buyers would be reluctant to purchase the bonds. As an alternative it has been suggested that a declaratory judgment be requested from appropriate courts, stating that the authority to issue bonds is implied in the language of the laws and that an Agency so organized has such authority. The decision on this matter should be made by competent legal counsel. In any case, specific legislation should be requested granting this authority to the Agency.

In the event the Agency cannot issue revenue bonds in the name of the Agency, it is recommended that one of the member municipalities issue the bonds under its own authority. The capital investments made with the bond proceeds would be held in the name of the municipality, at least until the bonds were paid. Meanwhile, land, improvements and equipment purchased with the bond proceeds would be leased to the Agency. The lease agreement and a pledge of the required funds from fees would be used as security to back the revenue bonds.

Revenue bonds do not affect the general bonding power of the municipality. They are not included in statutory debt limits nor are they an obligation of the municipality. Revenue bonds are secured only by the revenue produced by the activity for which they were issued.

We suggest that the City of Omaha should be the municipality to issue the revenue bonds for the needed capital associated with the four sites in the urban area. Sites 3 and 7 are within Omaha's political jurisdiction. Sites 1 and 5 are within the political jurisdiction of Sarpy County and Council Bluffs respectively. Omaha should enter into specific contractual agreements with these two jurisdictions to maintain proper access to these sites and assure their continued use. Omaha has need for these four sites and has the authority to issue revenue bonds. It is also in the interest of Omaha to provide facilities in excess of their own needs, to obtain a larger operation, and thus a more economical operation, resulting in a lower unit cost. The sites recommended are placed in such a position to be used economically by waste producers other than Omaha.

We suggest one of the cities in eastern Pottawattamie County issue the necessary revenue bonds to finance Site No. 8.

b. Operating Revenue. Operating revenue and debt service for bonds can be obtained from fees charged to the users of the sites. Initial operating funds may be obtained from assessments to the member municipalities and from the pre-sale of disposal fee coupons or tickets.

c. Revenue Required. The amount of revenue required for annual operating expense and debt service is summarized in Table IV-1. The cost estimates from which this table was prepared are explained in Part III. D.4. of this report.

The bond issue requirements for the anticipated one time capital investment are as follows:

Urban Sites 1, 3, 5 & 7	$ 2,034,000
Rural Site 8	83,000
Total	$ 2,117,000

The total revenue requirement, including debt service, debt service reserve and annual expenses is estimated to be $949,100 per year for the first year (1970).

TABLE IV-1

REVENUE REQUIREMENT AND INCOME FOR AGENCY DISPOSAL OF SOLID WASTE

A.	REVENUE REQUIREMENTS		
	1. First Year, 1970		
		a. Fixed Cost	$ 408,800
		b. Variable Cost	466,500
		c. Debt Service Reserve	73,800
		Total Revenue Required	$ 949,100
	2. Fourth Year, 1973		
		a. Fixed Cost	$ 408,800
		b. Variable Cost	429,200
		c. Debt Service Reserve	73,800
		Total Revenue Required	$ 911,800
B.	INCOME		
	1. First Year, 1970		
		751,200 Tons @ $1.40/Ton =	$1,051,700
	2. Fourth Year, 1973		
		691,000 Tons @ $1.40/Ton =	$ 967,400

d. Income. It will be necessary to provide income which is equal to the required revenue shown in Table IV-1. This income will be provided from fees charged to the users of the facilities. The expected income is shown in Table IV-1.

e. Disposal Fees. The disposal operation should be completely self-supporting by charging fees from the users of the facilities. Several systems for charging of fees are possible and are explained in the Appendix in Exhibit IV-1. The recommended system is based on the weight of material brought to the site in each vehicle. This requires scales and scale operators which are included in the estimates for Sites 3, 5 and 7. In the case of the Rural Site No. 8, such a small operation could not justify the expense of the use of truck scales. Therefore we recommend a fee based on volume of refuse be used which would be equivalent to the fee per ton charged at the other sites. Also, in the early years of operation of Urban Site No. 1, there would be insufficient waste to justify scales. We recommend a volumetric fee system for this site for the first several years.

The proposed fees are developed and explained in Part III. D. 7. of this report.

2. Collection System. The scope of this report does not include collection of solid waste; however we have briefly discussed in Part III of this report, the collection of certain solid wastes in the rural communities of eastern Pottawattamie County. We have also included collection of solid waste in the purpose and powers of the Agency. If the Agency would elect to provide collection service at this time the capital cost and operating expense could be billed to those communities being served.

We recommend that collection service and disposal service be treated as two separate and distinct operations and that separate accounting be provided for the necessary funds.

H. INTERIM ACTIVITIES. While the Agency is being formed an interim director should be appointed to guide the formation of the Agency, the preliminary work on financing and legislative problems, and the selection and hiring of a qualified permanent director. It would be desirable if the permanent director could be hired and the Agency brought into being within a few months.

The Agency has many activities which must be accomplished prior to starting collection or disposal of solid waste. Once the director is hired the following items should be accomplished:

1. Review the report recommendations and prepare a detailed statement of policy. There are several recommendations which the member municipalities may wish to modify and several which are stated in general terms, which must be defined in light of the particular needs of the members.

2. Review the report and make adjustments where necessary after it has been determined which municipalities have agreed to join the Agency.

3. With the aid of fiscal and legal consultants prepare the financing and legislative procedures, and pursue these matters at the proper time.

4. Conduct sanitary landfill site investigations and select the specific parcels of land to purchase.

5. Design the initial development of the sites which have been selected.

6. Assist the member municipalities in the interim improvements to their disposal facilities and the necessary arrangements to close the sites which are not to be continued.

7. Determine the total equipment needs of the Agency as formed. These needs will include leased equipment from those members with surplus equipment and new equipment. Prepare cost estimates for the purchase of equipment not being leased and cost estimates and schedules for initial purchase of equipment as leased equipment is replaced with Agency owned equipment.

8. Plan for the staffing of the Agency with regard for the employees now working in collection and disposal divisions in the member communities, and the recruitment and hiring of new personnel.

9. Prepare standard operating procedures, job descriptions, operating instructions and policies of the Agency which are pertinent to the operation of the collection and disposal services.

10. Plan the new collection routes which may be required to meet the needs of requested collection service, if the Agency decides to provide such service.

11. Determine the new revenue requirements and projected income based on actual conditions which will prevail at the time of operation.

12. Prepare all of the details for the orderly commencement of operation.

13. Assist in the sale of revenue bonds to produce the necessary initial capital.

14. Purchase the land and equipment, construct the necessary improvements, acquire the personnel.

15. Place the Agency into operation.

Part of the interim activities will require the assistance of specialists and consultants. Where there are member municipalities which have the required specialists on their staff and their duties will permit, these staff members may be used to advantage. It will probably be necessary to hire bond consultants in connection with the issuance of revenue bonds and engineering consultants to assist in the details of site selection and initial site development.

To finance the interim activities, it is recommended that an initial budget based upon per capita membership be paid to the Agency by the joining members.

This budget should include funds for the support of the director and his staff, required consultants and the initial operating funds for disposal facilities.

I STATE LEGISLATION

1. Financing and Eminent Domain. The State Legislation upon which the recommended Agency would be formed is described in Section C of this Part IV of the report. There are two areas in which the existing legislation is inadequate, i. e. ; there is no specific provision for the Agency to issue the required revenue bonds for the long-term capital financing and there is no specific provision for the agency to exercise the right of eminent domain.

To overcome the first deficiency, we have recommended in Section G, Part IV that the necessary revenue bonds be issued by a member municipality. To overcome the second defiency, the exercise of eminent domain, if condemnation became necessary, could be accomplished by the member municipality in whose jurisdiction the site was located.

It would be helpful if revenue financing and eminent domain authority were specifically provided in the laws of both Nebraska and Iowa.

In a solid waste report prepared for the metropolitan area of Des Moines in 1968, we recommended a similar agency be created under the provisions of Chapter 28E of the Iowa Code. We also recommended that the new agency pursue the problems of revenue bond financing and eminent domain with the State legislature. At the time of the final writing of this report, the Iowa Legislature has passed the required legislation. The language of the act can be found in Senate File 482. We recommend legislation be passed in the State of Nebraska which would have the same effect as that found in the language of the Iowa bill.

2. Authority of the Various Subdivisions of the State. In various places in the statutes of Iowa and Nebraska, authority has been given to cities of the several classes, towns, villages and counties, to provide for the collection or disposal of solid waste or both. In some cases this was accomplished by adding solid waste or words meaning solid waste to a list of other subjects covered; and in others, authority was specifically designated for solid waste matters. Some provisions specifically state "removal or disposal of garbage" whereas in other cases "disposal" is stated and it is presumed that "removal" is implied. In some cases there are controls on taxes and requirements for referendums and in others there are not.

As a practical matter, most communities can probably find adequate authority either expressed or implied to provide some form of collection and disposal of solid waste. It would be helpful, however, if adequate state laws concerning solid waste matters were available that granted broad specific powers to all cities, towns, villages and counties. This is particularly true when several political subdivisions of various classes join together to solve solid waste problems through an area wide agency approach such as is contemplated in this report because the Agency cannot do anything for a member municipality which the member does not have the authority to do for itself.

We have prepared a Proposed Solid Waste Disposal Act in the form of a bill which brings together under one title the authority for all cities, towns, villages and counties to handle solid waste problems. This proposed bill is enclosed in this Part IV of the report as Document IV-4. This bill contains provisions that we believe to be necessary and desirable from a viewpoint of public works, sanitation and solid waste management. It should be reviewed by competent legal counsel for matters of law and individual state constitution requirements.

As an alternate to this proposed act, we would recommend the various statutes of Iowa and Nebraska concerning solid waste matters be compared to the provisions in this act and the existing statutes be revised where necessary and desirable.

As a further alternate and as a minimum, we would recommend the following specific revisions:

a. Collection of Garbage and Refuse in Iowa Cities and Towns. In Section 368.24 - Garbage and Refuse Disposal of the Iowa Code, the power to establish a schedule of fees for garbage collection and certain

DOCUMENT IV-4, Page 1 PROPOSED SOLID WASTE DISPOSAL ACT

A BILL FOR AN ACT

RELATING TO SOLID WASTE DISPOSAL POWERS AND DUTIES, FINANCING THEREFOR: FIXING RATES AND CHARGES, COLLECTION THEREOF; CONTRACTING WITH PRIVATE PARTIES; SETTING MINIMUM STANDARDS, VIOLATIONS AND PENALTIES THEREFOR.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF (IOWA) (NEBRASKA):

SECTION 1. DEFINITIONS. Subdivision 1. As used in Section 1 to 15, the terms defined in this section have the meaning given them, except as otherwise provided or indicated by the context.

Subd. 2. "Solid Waste." "Waste" is unwanted or discarded material resulting from commercial, industrial and agricultural operations and normal community activities. Waste include solids, liquids and gases. Wastes which are solid or semi-solid containing insufficient liquid to be free flowing are classed as solid waste. Solid Waste is refuse and includes in part the following: garbage; rubbish; ashes and other residue after burning; street refuse; dead animals, animal waste; abandoned vehicles; agricultural, commercial and industrial waste; construction and demolition waste; and sewage treatment residue.

Subd. 3. "Solid Waste Disposal" means the storage, removal and collection of solid waste from public and private property, and its transportation to disposal facilities and its ultimate disposal by landfill, sanitary landfill, composting, incineration or other authorized and approved methods.

Subd. 4. "Facilities" means all or any vehicles, mechanical apparatus, equipment, machinery, incinerators, plants, buildings, structures, shop or office space, furniture and equipment, public or private grounds, purchased, leased, erected, constructed, or otherwise permanently or temporarily acquired, for the storage removal, collection, transportation and disposal of solid wastes.

Subd. 5. "Sanitary Landfill" is a controlled method of disposing of refuse on land without creating air, land or water pollution or nuisances or hazards to public health, welfare or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical volume, and to cover it with a layer of earth at the conclusion of each day's operation, or at such more frequent intervals as may be necessary.

Subd. 6. "Landfill" is the same as a sanitary landfill, except cover material is applied from time to time as required, instead of daily or more frequently. To be acceptable, landfills must be restricted to inert, non-combustible, non-putrescible solid waste materials.

Subd. 7. "Incineration" is the controlled process of burning solid, semi-solid, liquid or gaseous combustible wastes in an enclosed device, producing an inoffensive gas and a sterile residue containing little or no combustible material. The process is used to reduce the volume of waste material or to change the characteristics of hazardous wastes to a safer form.

Subd. 8. "Pollution" is the contamination of any air, water, or land so as to create a nuisance or render such air, water or land unclean or noxious, or impure so as to be actually or potentially harmful or detrimental or injurious to public health, safety or welfare, to domestic, commercial, industrial or recreational use, or to livestock, wild animals, birds, fish, or other aquatic life or to plant life.

Subd. 9. "Municipality" for the purpose of sections 1 to 15 means a city of any class, town, village, or a county representing its unorganized territory, town or other governmental subdivision, however organized.

Subd. 10. "Governing Body" means the board, council, trustees, commission, or other body of the municipality charged with the general control of its financial affairs; provided, that where the charter or law under which a municipality is organized confers bond issuing power or contracting authority on a particular board or body, such board or body is the governing body under the provisions of sections 1 to 15.

SECTION 2. DISPOSAL FACILITIES; AUTHORITY. Any municipality is hereby authorized and empowered to collect and remove solid waste from public and private property, and to transport and dispose of solid waste, and for these purposes is authorized and empowered (1) to acquire by gift, lease, purchase, or condemnation as provided by law, any land or interest in land, within or outside of the municipality, on which the governing body deems suitable to establish or operate facilities for the collection, transportation and disposal of solid wastes; (2) to purchase, lease, establish, erect, or construct facilities on such site or sites; (3) to enlarge, improve, repair, supervise, control, maintain and operate such facilities for disposal of solid waste; (4) to purchase or lease materials, equipment and machinery necessary in connection with the operation and maintenance of facilities for removal, collection, transportation and disposal of solid wastes; (5) to employ such personnel as may be necessary for the care, maintenance and operation of such facilities.

SECTION 3. BONDS AND TAXATION.

Subd. 1. The governing body of a municipality, however organized, is hereby authorized and empowered for the purpose designated in Section 2 of this Act, or for refunding bonds, to issue, from time to time as needed, the negotiable bonds of the municipality to the amount authorized by the governing body.

Subd. 2. The bonds shall be issued, negotiated, and sold in the manner and subject to the conditions prescribed by the - - -(list the appropriate statute provision or recite new provision as required)- - - - - - - , as heretofore or hereafter amended, so far as applicable to the municipality issuing bonds, except as herein otherwise expressly provided, and may levy all taxes necessary therefore. Such bonds and interest thereon and the expense of issuance thereof may be paid out of the proceeds of tax levies or out of revenue from fees or other sources, or both, and the governing body may pledge any such proceeds or revenues thereto.

Subd. 3.

(1) Nothing herein contained shall preclude a municipality from issuing revenue bonds for the purposes set forth under Section 2 of this Act, or to refund bonds. Such revenue bonds shall not impose any general liability upon the municipality but shall be secured only out of revenues derived from the charges as provided in Section 4. Such charges for solid waste disposal service shall be sufficient, at all times, to pay the cost of operation and maintenance thereof and to pay the principal of and the interest upon all revenue bonds issued, and to carry out all covenants that may be provided in the ordinance authorizing the issuance of any such bonds.
(2) Revenue bonds shall be issued, negotiated and sold in the manner and subject to the conditions prescribed by the - - - - - - -(list the appropriate statute provisions or recite new provisions as required)-- , as heretofore or hereafter amended, so far as applicable to the municipality issuing the bonds, except as herein otherwise expressly provided.

Subd. 4.

(1) The governing body of any municipality may levy taxes for any solid waste disposal purpose on all property taxable within the municipality. Any taxes, levied or to be levied, and any bonds or other evidences of indebtedness issued or to be issued for the purposes designated in Section 2 of this act, or any part thereof, shall not be subject to any limitation of a charter or state law and shall be excluded in computing amounts subject to any limitation on tax levies, bonded indebtedness or other indebtedness and the governing or managing body and the proper officers of the municipality concerned shall have the power and it shall be their duty to levy such taxes and issue such bonds and take such other lawful actions as may be appropriate and necessary to provide funds to meet the cost of accomplishing such purposes, notwithstanding any such limit and without any election or referendum therefor.
(2) A recital in any bond, or tax levy, that the same is issued or made for the purposes of a solid waste disposal facility or facilities, or any part thereof, is not subject to any provisions of law prescribing limits or requiring an election or referendum therefore, and shall be prima facie evidence thereof and that all requirements of law relating thereto have been complied with. In any suit, action, or proceedings involving the validity or enforceability of any bonds of a municipality or the security therefor, any such bond reciting in substance that it has been issued by the municipality to aid in financing a solid waste disposal facility or facilities, or any part thereof, shall be conclusively deemed to have been issued for such purpose, and in compliance with all requirements of the law relating thereto.

(3) For any solid waste disposal purpose, a municipality may levy taxes in anticipation of need and the provisions of this subdivision shall be applicable so far as appropriate to any such anticipatory levy. If such a tax is levied in anticipation of need, the purpose must be specified in the resolution of the governing body directing the levy, and proceeds of the tax must be used only for that purpose, and until used the proceeds shall be retained in a separate fund, or invested, as surplus in a sinking fund may be invested under - - - (list appropriate statute provisions or recite new provisions as required) - - - - - - -.

Subd. 5. In exercising power and authority under Sections 1 to 15, the action of the governing body of any municipality shall not be subject to approval of a board of estimate and taxation, nor subject to the provisions of a charter prescribing a particular method of authorizing issuance of bonds.

SECTION 4. EQUITABLE CHARGES FOR SOLID WASTE DISPOSAL SERVICES. Any municipality which has established and is operating, or which is proceeding to establish, or which may hereafter establish facilities for, or contracts for removal, collection, transporation or disposal of solid waste, in addition to all other powers granted to it, shall have authority, by an ordinance duly adopted by the governing body thereof, to charge just and reasonable rates or charges for such services, and to obligate the owners, lessees, or occupants of all property served to pay the cost of solid waste disposal service to their respective properties. These rates or charges shall take into account the character, kind, and quality of the service and of the solid waste, method of disposition, number of people served at each place of collection, and all other factors that enter into cost of service, including interest on principal, investments, amortization of principal, depreciation, and other overhead charges upon facilities owned and operated by the municipality or later acquired for such use. Such rates or charges when fixed may be billed in such manner as the governing body may determine, or added to and collected with water bills or bills for sewage disposal rendered to owners, lessees or occupants of property.

SECTION 5. FIXING RATES; PUBLICATION OF ORDINANCE. Before any rates or charges for solid waste disposal service are fixed under the authority of Section 4, the ordinance establishing such rates or charges shall be published or posted as by law provided, and shall set forth the rates or charges for each type of service, and shall contain a notice to all persons or parties interested that the same will be considered at a public hearing not less than three weeks from the publication or posting of said ordinance as required by law, upon which date a public hearing shall be conducted by the governing body at which any person affected by any rate or charge shall be given an opportunity to be heard as to the rate or charge he will be called upon to pay. The proposed ordinance may be amended by the governing body before enactment in any manner not inconsistent with the terms of the notice of hearing thereon. Said ordinance and the rates or charges established therein as proposed or as amended, shall take effect upon publication or posting of the ordinance as required by law, or at such later date as shall be fixed by such ordinance. Like procedure shall be followed before the establishment of any change in such rates or charges. Every ordinance upon enactment shall be signed, attested, filed, published or posted, and recorded as provided by law for enactment of ordinances.

SECTION 6. CHARGES; TAX LIEN ON LAND; COLLECTION. The rates, or charges for solid waste disposal service shall be a charge against the premises from which solid waste is collected, and the owner, lessee, or occupant of the premises, or against any or all of them; and any such claim for unpaid rates, or charges which have been properly billed to the occupant of the premises may be collected in a civil action in any court of competent jurisdiction, or, in the discretion of the governing body of the municipality, may be certified to the county auditor where the premises are located with the taxes against such property served and shall be collected as other taxes are collected. Payments of deliquent charges shall be credited to the fund as are current funds for that purpose, deducting therefrom any cost of collection accruing to the municipality.

SECTION 7. CONTRACT FOR SOLID WASTE DISPOSAL SERVICE BY OTHERS AUTHORIZED

(1) A municipality may provide solid waste disposal services by the use of its own forces and facilities or may contract for such services to be furnished to the municipality upon such terms and conditions as the governing body may determine in the public interest with any person, firm or corporation, private or public, or with any other municipality, and by ordinance may obligate the owners, lessees or occupants, of all property served to pay the cost of such services to their respective properties as provided under Section 4.
(2) The obligation incurred by any municipality in the making of any such contracts shall not be considered as a part of its indebtedness under the provisions of its charter, or by any law of this state

fixing the limit of amount of its indebtedness, nor shall it be required, at any time before making, or during the life of such contracts, to have specifically provided for the same by previous tax estimates or levy, or to provide for or have on hand in its treasury more money applicable to such contracts than the amount to be paid thereon during a single year.

SECTION 8. SOLID WASTE DISPOSAL FUND. The moneys received from the rates and charges as authorized by Section 4 shall be deposited in a fund separate and distinct from any and all other municipal funds, to be designated "Solid Waste Disposal Fund," which shall be a continuing fund to which shall be credited all receipts, and to which shall be charged all costs incident to such activity. Moneys may be temporarily advanced to said fund from any available unencumbered and unappropriated balance in any other fund or funds, and as receipts permit, reimbursement of moneys advanced from other funds shall be made.

SECTION 9. AUTHORITY TO DISPOSE OF LAND. The governing body of a municipality after public hearing upon notice given by publication or posting as by law provided may, upon determining that any tract of land or interest therein acquired under or subject to the provisions of Sections 1 to 15 is no longer needed for the purposes thereof, sell, lease, or otherwise dispose of such tract or interest upon such terms as it deems best in the public interest, or may provide for the use thereof for other purposes, so far as not inconsistent with any lawful restrictions on the use or disposal of such tracts or interest therein.

SECTION 10. EMINENT DOMAIN. A municipality is hereby authorized and empowered to exercise the power of eminent domain for carrying out the provisions of Sections 1 to 15. Such proceedings shall be in accordance with ---- (list appropriate statute provisions or recite new provisions as required) ------as now in force or hereafter amended.

SECTION 11. GIFTS, GRANTS OR LOANS. A municipality may, in its name and behalf accept gifts, grants or loans of money or other property from the United States, the state, or any other source for any purpose under Sections 1 to 15 may enter into any agreement for repayment or otherwise required in connection therewith, and may hold, use and dispose of such money or property for said purposes in accordance with the terms of the gift, grant, loan, or agreement relating thereto.

SECTION 12. RULES AND REGULATIONS, METHODS, AND MINIMUM STANDARDS. (1) A municipality may by ordinance establish rules, regulations, and minimum standards applicable to solid waste and land pollution which rules, regulations and standards shall meet at least the minimum requirements established by the --- (list appropriate state regulatory agency having responsibility).

(2) The governing body in providing for solid waste disposal may by ordinance, or any amendment thereto, provide in what districts or along which streets collection shall be made, and volume of solid waste to be collected, leaving certain amounts or types of solid waste to private disposal, but shall continue to have the authority to regulate the time and manner of private disposal, varied according to the nature of the solid waste accumulated and disposed of. Such regulation may provide for immediate abatement of any condition which is a menace to public health and safety. In such cases notice may be given to the owner or occupant of premises for the summary disposal of solid waste or unhealthy or unsafe condition by posting upon the premises notice of what is required. If the notice be not obeyed within the time fixed in said notice, the municipality shall have the right to remove such solid waste or such unhealthy or unsafe condition, charging such rates or charges as are prescribed, or the cost thereof, and shall have the right to collect the same as rates and charges are herein authorized to be charged, made and collected. In lieu of such method, the municipality may for adequate compensation by contract with the owner of any premises, perform any service upon public or private property in the removal of solid waste, covering with proper filling material any foul, unhealthy or unsafe material, including low grounds, which are or may become foul, unhealthy or unsafe.

(3) The governing body shall have the authority to direct the method of handling and storage of solid waste on public or private premises, to require the owner, lessee or occupant of the premises to place the same at the most convenient place upon the premises, and if convenience in the collection thereof requires containers on premises for the handling thereof, the governing body may require the same.

(4) The governing body may adopt and amend ordinances regulating the use of disposal facilities. Such ordinances may also establish standards which upon adoption shall govern the operation of solid waste disposal facilities throughout the municipality, including those operated by the municipality, other public agencies or by private operators. Such regulations may apply to the location of solid waste disposal facilities, requirements relative to the sanitary operation thereof, requirements regarding the equipment necessary relative to the amount of material being received at the facility, requirements in relation to the control of salvage operations, rodent control, water or air or land pollution control, and such other subjects as may be required for the public health, welfare, and safety relative to the operation of such facilities. The municipality may issue permits or licenses for commercial private solid waste disposal facilities and may require that all solid waste disposal facilities be registered with the appropriate municipal office. Before acting on an ordinance regulating the operation or location of solid waste disposal facilities, the governing body shall hold a public hearing upon the proposal therefor upon at least three weeks notice given by publication or posting as required by law, stating briefly the subject matter and the general purposes of the proposed ordinance. The proposed ordinance may be amended by the governing body before enactment in any manner not inconsistent with the terms of the notice of hearing thereon. Said ordinance, as proposed or as amended, shall take effect upon publication or posting of the ordinance as required by law. Every ordinance upon enactment shall be signed, attested, filed, published or posted, and recorded, as provided by law, for enactment of ordinances.

SECTION 13. VIOLATIONS, PENALTIES. Any municipality is hereby authorized by ordinance to impose penalties and provide for punishment for violation of any ordinance or regulation relative to the accumulation of solid waste, its collection or disposition.

SECTION 14. JOINT COOPERATION.

(1) A municipality may be a party to a joint cooperative project, undertaking, or enterprise with any one or more other governmental subdivisions or other public agencies for any purpose under Section 2 upon such terms as may be agreed upon between the governing bodies or authorities concerned. Without limiting the effect of the foregoing provision or any other provisions of Sections 1 to 15, a municipality, with respect to any of said purposes, may act under and be subject to the provisions of ---- (Iowa Chapter 28E; or Nebraska Chapter 23, Article 22) ---------------, as now in force or hereafter amended, or any other appropriate law now in force or hereafter enacted providing for joint or cooperative action between governmental subdivisions or other public agencies.
(2) A municipality may, upon such terms as may be agreed upon with the respective governing bodies or authorities concerned, authorize the use by any other governmental subdivision or other public agency of any facilities of the municipality constructed or used for any purpose under Section 2 so far as the capacity thereof is sufficient beyond the needs of the municipality. A municipality may expand any such facilities and permit the use thereof by persons, firms, corporations, private or public, municipalities or other public bodies, outside the municipality, so far as the capacity thereof is sufficient beyond the needs of the municipality upon such terms as the governing body may prescribe.

SECTION 15. POWERS ADDITIONAL.

(1) It is hereby found and determined that solid waste disposal is a matter of statewide concern and that the provisions of Sections 1 to 15 shall be independent of and in addition to any other provision of the laws of the State of (Iowa) (Nebr.) with reference to the matters covered hereby and shall be considered as a complete and independent act and not as amendatory of or limited by any other provision of the laws of the State of (Iowa) (Nebr.) The purpose of these sections is to permit any municipality to engage in the activities hereinbefore authorized, and to promote the public health, safety, welfare, convenience and prosperity of the municipality. The activity herein authorized shall be considered a public utility and such activity may be merged and operated with any other municipally operated utility, if deemed necessary and economical. Accounting for the activity herein authorized shall be separate as hereinbefore directed.
(2) If any provision of sections 1 to 15 is held unconstitutional or invalid, it shall not affect the other provisions.

other functions is limited to cities of twenty thousand or more population. We recommend this limit be removed for cities and towns in Iowa where the city or town is a member of an agency such as the one proposed here, and that agency has a total membership in excess of twenty thousand population, and the Agency is prepared to provide the services contemplated in 368.24.

b. Collection of Garbage and Refuse in Iowa and Nebraska Counties. There is no provision for the counties in Iowa or Nebraska to provide for the collection and disposal of garbage and refuse in the unorganized parts of the county. We recommend that permissive state legislation be passed in both states which allows counties to provide such collection and disposal service in such portions of the county as the Board of Supervisors or Board of Commissioners determine is needed and to provide that a schedule of fees may be established to pay for such services.

Until such legislation is provided, it is possible that part of the unorganized portion of the counties may be served on a voluntary basis.

c. County Disposal of Refuse in Nebraska, Chapter 23 of the Statutes recognizes the need for counties to provide refuse disposal facilities and grants authority necessary to provide the facilities. These provisions were added in 1967, when the current general solid waste revisions were passed.

In Iowa, Sections 332.31 thru .34, the Statutes recognized the counties role in refuse disposal but they are not as broad as in Nebraska and further, they work through the township which could become cumbersome with an Agency operated system. We recommend the Iowa statutes be broadened in a manner similar to the Nebraska Statutes covering county refuse disposal and that the county be authorized to act as a county, eliminating the provisions or requirement to work through the township.

3. State Regulatory Agency. The primary responsibility for maintaining the public health standards for the disposal of solid waste must be borne by the local political jurisdiction in which the facility is located; whether it be a city, town, village or county. This is an inescapable responsibility which is proper, traditional and practical. In addition to public health matters which are matters of statewide concern, they should also be concerned with local matters such as economy, adequacy, future capacity, zoning, aesthetic considerations, traffic, rate schedules or fees, hours and days of operation, and others.

The State has two areas of responsibility in solid waste disposal. First, they should assume a position of leadership and assist the local jurisdictions in developing a competence in those aspects of local concern where this assistance is needed and requested. Second, they should assume responsibility for establishing minimum technical provisions for solid waste disposal that may be necessary to protect the public health, as a matter of statewide concern. The matters of local concern listed above are not suitable subjects for the state to regulate. Fees and zoning and other similar matters are the affairs of the local community. The state can be helpful in these areas but should not be given any regulatory authority. However, the state has a definite responsibility to safeguard public health, in matters of statewide concern, and solid waste disposal certainly must be considered as falling within this category. To maintain a separation between statewide and local matters, the state should limit their regulatory authority to establishing and enforcing the minimum technical standards required to insure sanitary disposal of solid waste.

In 1967, the State of Nebraska placed the responsibility for proper solid waste disposal in the State Health Department, and provided in Chapter 71, Article 41, the authority for the Director of Health to regulate this practice, to set standards, and to license disposal sites. A very modest staff was provided to implement the provisions of the Article 41. It is expected that this law will be highly effective in improving solid waste disposal conditions in the State.

There is no similar law in Iowa, where the State Health Department does not have specific authority in the field of solid waste disposal. Some progress can be made under Iowa's general health laws and in specific cases where water pollution laws can be invoked against improper solid waste disposal practice which is causing water pollution. New air pollution laws will soon be available to apply to solid waste disposal facilities where open burning is practiced.

We recommend Iowa add specific provisions to their statutes granting the Department of Health specific authority to license, set minimum technical standards, and regulate solid waste disposal in Iowa.

In addition to specific authority for the Iowa Health Department, both the Iowa and Nebraska Health Departments will need to adequately staff their organization to implement the provisions of the law. The scope of this report does not include a study of the staffing requirements of the state agency, but to assure proper management of solid waste disposal in this Study Area, the periodic inspection by the state regulatory agency would be desirable.

We recommend a state inspector visit each disposal facility at least once each quarter for the purpose of inspection for minimum technical standards, and to assist the facility's managers and operators in solving disposal problems.

We further recommend that both departments require all disposal facilities be licensed by the state. As a condition for licensing, each applicant should be required to submit detailed plans, prepared by a professional engineer registered in that state. The plans should include an area topographic plan, subsurface investigation, initial development of the site, an operational plan, and whatever other data the department may require.

J. LOCAL LEGISLATION

1. Disposal Ordinance. The recommended public sanitary landfill sites will be located in places under municipal jurisdiction. Even though these sites may be operated by a non-profit governmental agency for and on behalf of the counties and other municipalities, it is important that these public sites and any private disposal activities come under the health regulation of the jurisdiction in which the sites are located. As an extra precaution to assure that proper health conditions are maintained at all times, each city, town, village, or county should pass reasonable but adequate regulations for all disposal activities conducted within their jurisdiction.

Because each municipality has a slightly different format for regulation, and has different provisions for licensing, fees and inspection procedures; we have prepared a typical Disposal Ordinance, patterned after a typical City format. This ordinance, which contains what we believe to be the essential elements for such an ordinance, is enclosed in this Part IV of the report as Document IV-2.

Each municipality should modify the recommended Disposal Ordinance to conform to their local format and procedures, and add to this ordinance any local provisions necessary to suit their form of government and any special requirements which they deem necessary. They should also add specific language designating who in their local governmental unit shall act as the "Health Officer" who shall be responsible for the required administration and enforcement.

2. Collection Ordinance. A typical collection ordinance has also been prepared, patterned after a typical city format. This ordinance, which contains what we believe to be the essential elements for such an ordinance, is enclosed in this Part IV of the report as Document IV-3.

If the Agency and certain municipalities wish to provide a collection service, the ordinance can be used as a guide for the required ordinances. If the Agency does not offer such a service, the ordinance may still be of some value to the municipalities, as a guide in the preparation of an ordinance for their own collection service.

Each municipality should modify this collection ordinance in a manner similar to the modifications described in the preceding paragraphs concerning the Disposal Ordinance.

3. Junked Automobiles. In Part II, Section D, of this report, the problems associated with junked motor vehicles are discussed and local

legislation is recommended. We have found that several communities in the Study Area now have adequate local legislation to cope with the objectionable aspects of this problem. In general, these laws are not fully enforced.

Zoning and licensing laws should be enforced to assure that commercial auto salvaging and scrap metal dealers operate their businesses in places zoned for this activity and in accordance with licensing regulations. This would eliminate a substantial portion of the problems associated with this industry. Where junked auto hulks or inoperative vehicles are stored on private property and these vehicles are a nuisance, they can be controlled through an ordinance which declares them to be litter. Omaha Ordinance Section 25.85.050 states "It shall be unlawful for a person to place, cause to be placed or allow to remain on this property, a motor vehicle or part thereof which is in wrecked, junked, partially dismantled, inoperative or abandoned condition; provided, however, that this Section shall not apply to any motor vehicle which is kept in the operation of a business pursuant to any municipal ordinance or kept a garage." Section 25.85.060 provides for the removal of such vehicles.

Council Bluffs has a similar ordinance and has used it effectively from time to time.

K. SANITARY LANDFILL STANDARDS

In the preceding Section J, we recommended that each municipality in which a sanitary landfill is located adopt an ordinance controlling the disposal of solid waste. In the recommended Ordinance, Document IV-2, standards for Sanitary landfills are set forth in Section 3. These standards contain the essential elements for a first class type operation which if enforced would insure that such a disposal facility would be compatible with other land use and urban living.

Some authorities have produced standards with lesser requirements for sites not in an urban area. In fact, we have recommended from time to time in other reports that different standards be applied to Urban, Isolated and Remote areas. In the Omaha-Council Bluffs Metropolitan Area, the four recommended urban sites should certainly be constructed and operated to the highest standards. In the case of the one rural site in eastern Pottawattamie, it is possible that some requirements could be relaxed such as sight screening of the site; however, the requirements which could be relaxed are not significant in the overall cost of the facility. We recommend that all of the facilities be constructed and operated in a way to meet or exceed the standards listed above.

L. ALTERNATE POSSIBILITIES

1. Organizational Structures. There are many organizational structures which could be used for the frame work necessary for the safe and sanitary disposal of solid waste in addition to the bi-state public agency which is recommended. Included in the possibilities are the following:

Individual Community Effort

1. Each community provide facilities for own use either through own operation of facilities or agreement to use neighbor's facilities.

2. Some communities may provide for joint use of miscellaneous facilities through inter-local cooperation Act of Nebraska and joint exercise of Government Powers of Iowa.

3. Some communities may use private enterprise disposal facilities open to public for fee or community contract.

4. Any combination of 1, 2 and 3 above.

Individual County Effort

1. Each county provide facilities for use of county residents and communities.

2. One county provide for self and neighboring county through agreement.

3. Some combination of counties providing joint use of miscellaneous facilities through Joint Powers Acts of Iowa and Nebraska.

4. Private enterprise.

5. Any combination of 1, 2, 3 and 4 above.

Regional Effort

1. Form a Nebraska area regional organization to provide facilities for Nebraska and an Iowa area regional organization to provide facilities for Iowa.

2. One state regional organization provide for self and other state regional organization through agreement.

3. Form a regional organization to provide for joint use of facilities for entire two state Study Area through Joint Powers Acts of Iowa and Nebraska. (This is the recommended plan).

4. Form a regional organization to prepare a regional area solid waste plan. Each county or each community or combination of counties and communities carry out own disposal in accordance with plan.

5. Private enterprise.

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6. Any combination of 1, 2, 3, 4, and 5 above.

In general the individual efforts of the cities and to some extent the counties, to provide facilities for their own use, would result in duplication of facilities, equipment and management. In most cases the facilities would be too small to be economical and too small to attract and afford professional management. The single exception to this fact would be the City of Omaha. This city is large enough to operate large sites, without prohibitively high costs, although the costs would exceed the costs contemplated in the joint agency approach.

Joint facilities to be shared by various municipalities or contract arrangements would be an improvement over strictly individual efforts but the same disadvantages would prevail except to a lesser extent. Again the exception would be the City of Omaha. If this city would provide facilities for themselves and neighboring communities the efficiency could approach that of the recommended agency. The principal disadvantage to this arrangement would be the political and jurisdictional problems which usually appear when a giant city attempts to provide services to smaller neighboring communities. This would be particularly true in the location of sanitary landfill sites outside the political jurisdiction of the large city.

Private enterprise could provide the required facilities, however, there are several serious flows in this concept. As explained in detail in Part III the total cost of solid waste disposal is made up of two basic items, i.e., the cost of hauling the waste to a disposal facility and the cost of operation of that facility. The proper location of the proposed facilities, to produce the lowest total cost, is very important. Private enterprise without the ability to exercise the right of eminent domain could experience serious problems acquiring the necessary property in the right general areas.

Facilities provided by private enterprise must pay taxes and are intended to operate for a profit. It can be argued and indeed it is often true that private enterprise is more efficient than public agencies and can make a profit charging the same fees. This is not necessarily true when a public agency is provided with adequate resources and is professionally managed. The recommended agency should be able to operate in the same way as private enterprise but will enjoy the very significant advantage of eminent domain, no taxes and no need to produce a profit.

2. Operation of Agency Facilities. The recommendation in this report contemplates that all of the solid waste disposal facilities be owned and operated by the agency using the agency's own forces and equipment. As an alternate to this, the agency could award contracts to private operators to operate the facilities for the agency. It would be necessary to prepare detailed specifications setting forth exactly what the Contractor would be required to do and what the agency would be required to do. It would also be necessary to prepare a new cost estimate to include taxes and profit for the Contractor.

If the agency would desire to contract for the operation we would recommend the agency furnish the land and capital improvements to the land, including the initial development. These improvements should be permanent and amortized over a long period.

M. FEDERAL PARTICIPATION. The preparation of this study and report was financed partially with local funds from the MAPA, and partially through a Federal Grant from the Office of Solid Waste, USPHS, Department of Health, Education and Welfare. This grant was authorized under the provision of the "Solid Waste Disposal Act" which became law during the 89th Congress. (PL89-272)

In the current session of the 91st Congress, there are bills in both the House of Representatives and the Senate which offer amendments to the Solid Waste Disposal Act. Some of the bills are similar or identical to bills which died in committee at the end of the 90th Congress. Of particular interest to the MAPA and the Agency are provisions of "Grants for Construction". Not only are grants included but there are provisions for larger grants to organization serving more than one community as contemplated in this report.

Under these bills it would be possible for the Agency to receive up to 75% of the cost of construction of solid waste facilities, including completion and improvement of existing facilities.

Progress of these amendments should be carefully watched by the Agency Board and the Director. A sizeable grant toward constructing and equiping the landfill sites could considerably reduce the size of the revenue bond issue required for the Agency's initial operation. This would, in turn, also reduce the disposal fees that would be required.

It is not suggested that any of the improvements or recommendations made in this report be delayed pending the possibility of additional Federal Funds. It has been demonstrated that these improvements can be made and service improved at a reasonable cost to the community. However, any additional method of reducing these costs should not be overlooked as they might become available.

DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE

Form Approved
Budget Bureau No. 68-S-68019

COMMUNITY SOLID WASTE PRACTICES

LAND DISPOSAL SITE INVESTIGATION REPORT

2 (1)

1. STATE ☐☐ (2 3)
2. COUNTY ☐☐☐ (4 5 6)
3. SITE LOCATION *(Political Jurisdiction)* ☐☐☐☐ (7 8 9 10)
4. NAME OF SITE ☐☐☐ (11 12 13)
5. ADDRESS OF SITE 1 (14)
6. DATE OF SURVEY DAY ☐☐ (15 16) MONTH ☐☐ (17 18) YEAR ☐☐ (19 20)
7. NAME OF PERSON COMPLETING FORM
8. TITLE
9. ORGANIZATION AND ADDRESS

10. POLITICAL JURISDICTIONS SERVED BY LAND DISPOSAL SITE

NAME OF POLITICAL JURISDICTION		ESTIMATED PERCENTAGE OF JURISDICTION SERVED BY SITE	AVERAGE DISTANCE OF SITE FROM CENTER OF SOURCE AREA *(Miles)*
	☐☐☐☐ (21 22 23 24)	☐☐ (25 26)	☐☐ (27 28)
	☐☐☐☐ (29 30 31 32)	☐☐ (33 34)	☐☐ (35 36)
	☐☐☐☐ (37 38 39 40)	☐☐ (41 42)	☐☐ (43 44)
	☐☐☐☐ (45 46 47 48)	☐☐ (49 50)	☐☐ (51 52)

FOR ADDITIONAL ENTRIES, CHECK HERE ☐ (53) *AND MAKE ENTRIES IN ITEM #45*

11. SITE OPERATED BY
☐ PUBLIC AGENCY
☐ PRIVATE AGENCY
☐ (54)

12. SITE OWNED BY
☐ PUBLIC AGENCY
☐ PRIVATE AGENCY
☐ (55)

13. IS OPERATION REGULATED BY A HEALTH AUTHORITY? ☐ YES ☐ NO
IF YES, INDICATE LEVEL OF PRINCIPAL AUTHORITY *(Check one only)*
☐ COMMUNITY ☐ STATE
☐ COUNTY ☐ OTHER ______ *(Specify)*
☐☐ (56 57)

14. GENERAL CHARACTER OF SITE *(Check one only)*
☐ QUARRY OR BORROW PIT
☐ GULLY-CANYON
☐ LEVEL AREAS
☐ OTHER ______ *(Specify)*
☐ HILLSIDE
☐ MARSH, TIDELAND OR FLOOD PLAIN
Do not use 58 ☐

15. YEAR SITE PLACED IN OPERATION 19☐☐ (59 60)
16. ANTICIPATED LIFE REMAINING *(Years)* ☐☐☐ (61 62 63)
17. TOTAL AREA OF SITE *(Acres)* ☐☐☐☐ (64 65 66 67)
18. AREA TO BE USED FOR LAND DISPOSAL *(Acres)* ☐☐☐☐ (68 69 70 71)

19. ZONING/LAND USE SURROUNDING FACILITY *(Check predominant type only)*
ZONING
☐ NONE
☐ RESIDENTIAL
☐ COMMERCIAL
☐ INDUSTRIAL
☐ AGRICULTURAL
☐ OTHER ______ *(Specify)*
LAND USE
☐ RESIDENTIAL
☐ COMMERCIAL
☐ INDUSTRIAL
☐ AGRICULTURAL
☐ OTHER ______ *(Specify)*
☐☐ (72 73)

20. IS USE OF COMPLETED SITE PLANNED? ☐ YES ☐ NO
IF YES, CHECK PREDOMINANT USE ONLY
☐ RECREATIONAL AREA OR PARK
☐ PARKING LOT
☐ LIGHT CONSTRUCTION
☐ HEAVY CONSTRUCTION
☐ AGRICULTURE
☐ OTHER ______ *(Specify)*
☐ USE NOT DETERMINED
☐ (74)

21. WILL PUBLIC AGENCY CONTROL COMPLETED SITE USE? ☐ YES ☐ NO

22. MATERIAL USED FOR COVER *(Check one only)*
☐ NONE
☐ EARTH
☐ OTHER ______ *(Specify)*
☐☐ (75 76)

23. FREQUENCY OF COVER *(Check one only)*
☐ NONE
☐ DAILY *(End of each working day)*
☐ DAILY *(Except face)*
☐ OTHER ______ *(Specify)*

24. IS SPREADING AND COMPACTION OF REFUSE HANDLED IN APPROXIMATELY TWO-FOOT LAYERS OR LESS? ☐ YES ☐ NO
☐☐ (77 78)

25. NUMBER OF DAYS DISPOSAL SITE COULD NOT BE USED BECAUSE OF WEATHER CONNECTED CONDITIONS *(Enter average per year)* ☐☐ (79 80)

26. GENERAL CHARACTER OF OPERATION *(Judgment evaluation - check appropriate categories)*

2 (14)

APPEARANCE	IS BLOWING PAPER CONTROLLED?	IS BLOWING PAPER CONSIDERED TO BE A NUISANCE?	ROUTINE BURNING	ARE THERE SURFACE DRAINAGE PROBLEMS?	ARE THERE LEACHING PROBLEMS?
☐ SIGHTLY ☐ UNSIGHTLY	☐ YES ☐ NO	☐ YES ☐ NO	☐ NONE ☐ UNCONTROLLED ☐ PLANNED AND LIMITED	☐ YES ☐ NO	☐ YES ☐ NO
15 ☐	16 ☐	17 ☐	18 ☐	19 ☐	20 ☐

[illegible]

Exhibit I-1 Page 1

LAND DISPOSAL SITE INVESTIGATION REPORT (Page 2)

27. CONTROL PROGRAMS

		YES	NO	Do not use
RODENT CONTROL PROGRAM	NEEDED	☐	☐	21
	PROVIDED	☐	☐	22
FLY CONTROL PROGRAM	NEEDED	☐	☐	23
	PROVIDED	☐	☐	24
BIRD CONTROL PROGRAM	NEEDED	☐	☐	25
	PROVIDED	☐	☐	26
DUST CONTROL PROGRAM	NEEDED	☐	☐	27
	PROVIDED	☐	☐	28
ODOR CONTROL PROGRAM	NEEDED	☐	☐	29
	PROVIDED	☐	☐	30

28. IS LOWEST PART OF FILL IN WATER TABLE? ☐ YES ☐ NO ☐ 31

29. FIRE PROTECTION ☐ NONE ☐ WATER ☐ FIREBREAK ☐ OTHER ______ *(Specify)* ☐ 32

30. NUMBER OF TIMES FIRE CONTROL EQUIPMENT WAS REQUIRED AT SITE IN THE PAST YEAR ☐☐☐ 33 34 35

31. IS SALVAGING PERMITTED? ☐ YES ☐ NO ☐ 36

32. IS SALVAGING PRACTICED? ☐ YES ☐ NO ☐ 37

33. ESTIMATED NUMBER OF LOADS DEPOSITED DAILY *(Average)*

FROM PUBLIC COLLECTION VEHICLES	FROM PRIVATE COLLECTION VEHICLES	FROM OTHER VEHICLES ______ *(Specify)*
(Enter number) ☐☐☐ 38 39 40	*(Enter number)* ☐☐☐ 41 42 43	*(Enter number)* ☐☐☐ 44 45 46

34. ARE QUANTITATIVE RECORDS KEPT IN ANY FORM? ☐ YES ☐ NO *Do not use* ☐ 47

35. QUANTITIES OF SOLID WASTES RECEIVED ANNUALLY

TONS WEIGHED		48	49	50	51	52	53	54
TONS ESTIMATED		55	56	57	58	59	60	61
CUBIC YARDS	62	63	64	65	66	67	68	69

36. GENERAL CLASSIFICATION OF SOLID WASTES ACCEPTED AT DISPOSAL SITE *(Check those accepted)*

- ☐ 70 HOUSEHOLD
- ☐ 71 COMMERCIAL
- ☐ 72 INDUSTRIAL
- ☐ 73 AGRICULTURAL
- ☐ 74 INSTITUTIONAL
- ☐ 75 INCINERATOR RESIDUE ONLY

37. CHECK ANY ITEMS LISTED BELOW WHICH ARE EXCLUDED FROM THE DISPOSAL SITE ☐ 3 14

- ☐ 15 ALL PUTRESCIBLES
- ☐ 16 ALL NON-COMBUSTIBLES
- ☐ 17 ALL COMBUSTIBLES
- ☐ 18 GARBAGE
- ☐ 19 DEAD ANIMALS
- ☐ 20 WASTE OIL
- ☐ 21 SEWAGE SOLIDS
- ☐ 22 JUNKED AUTOMOBILES
- ☐ 23 LARGE APPLIANCES
- ☐ 24 DEMOLITION WASTES
- ☐ 25 CONSTRUCTION DEBRIS
- ☐ 26 STREET SWEEPINGS
- ☐ 27 TIRES
- ☐ 28 HAZARDOUS MATERIALS
- ☐ 29 OTHER *(Specify)* ______ ☐ 30
- ☐ 31 OTHER *(Specify)* ______ ☐ 32
- ☐ 33 OTHER *(Specify)* ______ ☐ 34

38. EQUIPMENT AVAILABLE *(Average utilized daily)*

		NUMBER	
DRAGLINE OR SHOVEL-TYPE EXCAVATORS		35	36
SCRAPERS *(Self-propelled)*		37	38
TRACTORS *(Track or Rubber Tire)* *(Bulldozer or High Lift Loader)*		39	40
TRUCKS		41	42
OTHER ______ *(Specify)*	*Do not use* 43	44	45
OTHER ______ *(Specify)*	*Do not use* 46	47	48

39. TOTAL NUMBER OF EMPLOYEES ON SITE *(Average daily)* ☐☐ 49 50

40. HOURS OF DAILY OPERATION *(On a 24-hour clock)* BEGIN ☐☐ 51 52 END ☐☐ 53 54

41. NUMBER OF DAYS OPERATED PER WEEK ☐ 55

42. ANNUAL OPERATING COST *(Including supervision and equipment maintenance)* $ ☐☐☐☐☐☐☐ 56 57 58 59 60 61 62

43. IS THIS A SANITARY LANDFILL? ☐ YES ☐ NO ☐ 63

44. IF SOURCES OTHER THAN REPORTER DESIGNATED IN ITEM 7 WERE UTILIZED IN COMPLETING THIS FORM, INDICATE BELOW THE SOURCES USED AND ITEM NUMBERS

NAME OF PERSON	TITLE	ORGANIZATION	ITEM NUMBER(S)

[illegible]

Exhibit 1-1 Page 2

LAND DISPOSAL SITE INVESTIGATION REPORT (Page 3)

45 CONTINUATION ITEMS

ITEM NO	ADDITIONAL INFORMATION

46 REMARKS *(Attach additional sheet if necessary)*

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Exhibit I-1 Page 3

TENTATIVE RATING METHOD FOR SANITARY LANDFILL OPERATIONS[1]

ITEM 1: Access Road. Access roads shall be designed and constructed so that traffic will flow smoothly and will not be interrupted by ordinary inclement weather.

Reason. In order to avoid needless expense, it is of the utmost importance that collection vehicles are not delayed at the disposal site and that all refuse is unloaded only at the fill area. Since the refuse hauling operation is unproductive time for the refuse collectors, any unnecessary delays are costly and can result in unfinished collection routes.

This item shall be rated as follows:

If an all-weather access road, negotiable by loaded collection vehicles, has been provided to the entrance of the landfill.
3 points

If the access road provided is negotiable under most conditions and an alternate site is located so as to provide for the sanitary disposal of refuse during inclement weather.
2 points

If the road is negotiable in good weather only and no alternate site is provided.
0 points

ITEM 2: Employee Facilities. Suitable shelter and sanitary facilities shall be provided for personnel.

Reason. Shelter is a desirable protection of the landfill employees during inclement weather. Toilet and handwashing facilities are desirable for good personal hygiene for landfill employees and collection personnel. Better working conditions contribute to employee morale and retention.

This item shall be rated as follows:

If permanent or temporary shelter of adequate size is provided, along with safe drinking water, sanitary handwashing and toilet facilities, suitable heating facilities, screens, and electricity (if needed).
3 points

If temporary shelter is provided with suitable heating facilities, screens, and an approved portable toilet.
2 points

If no shelter and toilet facility is furnished.
0 points

ITEM 3: Measuring Facilities. Provision shall be made for weighing or adequately measuring all refuse delivered to and disposed in the sanitary landfill.

Reason. A suitable method of measuring incoming and/or deposited refuse is desirable to provide a reliable quantity of data, to determine trends and to estimate future needs. Estimates of volumes based on truckloads rather than weights are misleading. Weighing provides the best basis for establishing fees requiring scales as an integral part of the sanitary landfill operation. Weighing discourages trips to the site with half-filled trucks. Determination of the volume increments in deposited refuse may be done by periodic volumetric surveys, permitting evaluation of the use-rate and remaining capacity of the site.

This item shall be rated as follows:

If suitable fixed or portable scales have been installed at the sanitary landfill and are used continuously or if the landfill is

---

[1] Not for General Distribution
Subject to Revision

Solid Waste Branch, Training Institute, ECA routinely "cross-sectioned" to determine volumes in place (routine - each 30 days minimum).

2 points

If a scale is located on the way to the site (such as transfer stations) and is in continuous use.

1 point

If no weighing is accomplished and routine measurements of volume in place are not taken (each 30 days minimum).

0 points

ITEM 4: Communications. Telephone or radio communications shall be provided at or near the sanitary landfill site.

Reason. Communications are desirable at the generally remote sanitary landfill sites, in case of emergency. If the sanitary landfill is part of a combined collection and disposal system, good communications will result in better performance throughout the system.

This item shall be rated as follows:

If reliable telephone or radio communications are installed at the site.

2 points

If communications are located within three miles and a suitable vehicle is available at the site at all times.

1 point

If communications are greater than three miles distant.

0 points

ITEM 5: Fire Protection. Suitable measures shall be taken to prevent and control fires. Open burning shall be prohibited.

Reason. Fires endanger life and property. Smoke and odors create nuisances to surrounding property owners, endanger disposal personnel, and interfere with landfilling operations. Fires on sanitary landfills cause them to revert to a status equivalent to open dumps.

This item shall be rated as follows:

If an adequate supply of water under suitable pressure is available with necessary hose, etc.; a stockpile of earth is maintained reasonably close to the working face of the fill for smothering fires; a suitable fire extinguisher is maintained on all equipment and in all buildings; and open burning is prohibited.

3 points

If the site has a stockpile of earth reasonably close to the working face of the fill and open burning is prohibited.

2 points

If fire protection is not present or open burning is allowed. 0 points

ITEM 6: Limited Access. Access to a sanitary landfill shall be limited to those times when an attendant is on duty and only to those authorized to use the site for disposal of refuse.

Reason. If public use of a sanitary landfill is allowed when no attendant is on duty, scavenging, burning and indiscriminate dumping commonly occur. Men and equipment must then be diverted from operations to restore sanitary conditions. When access to the site during operating hours is limited to those authorized, traffic and other accident hazards are minimized.

This item shall be rated as follows:

If access by unauthorized vehicles or pedestrians is prohibited.

3 points

If access is prohibited except during working hours.

2 points

If access is uncontrolled.

0 points

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*An Engineering Survey procedure to determine volume increments, in place, in the filled portion of the landfill. Convenient bench marks should be established.

ITEM 7: Unloading. Unloading of refuse shall be restricted and controlled.

Reason. For proper operation, systematic placement of refuse, restricted to a small unloading area and coordinated with spreading and compacting is required. Controlled unloading reduces work, conserves landfill volume, permits better compaction, minimizes scattering of refuse and expedites unloading of collection vehicles.

This item shall be rated as follows:

If unloading is controlled and the unloading area is restricted to a minimum.
2 points

If adequate unloading directions are clearly set forth by legible signs, if an unloading supervisor is on hand most of the time and unloading is performed in a satisfactory manner.
1 point

If unloading is uncontrolled or if the unloading area is too large for adequate compaction and daily cover.
0 points

ITEM 8: Size of Working Face. The working face of a sanitary landfill shall be confined enough to be easily maintained with available equipment.

Reason. A large working face increases the area to be compacted and covered with concurrent high cost, delay and difficulty in controlling fires.

This item shall be rated as follows:

If the size of the working face is small but is adequate for the collection vehicles to unload promptly.
2 points

If the working face is larger than the estimated minimum area required.
1 point

If the working face is much larger than necessary and/or the dumping is uncontrolled.
0 points

ITEM 9: Blowing Litter. Blowing litter shall be controlled by providing fencing near the working area or by use of earth banks or natural barriers. The entire landfill site shall be policed regularly and unloading shall be performed so as to minimize scattering of refuse.

Reason. The purpose of the sanitary landfill is to dispose of the refuse in a sanitary nuisance-free manner. If papers and other light materials are scattered and the area is not policed, fire hazards, nuisances, and unsightliness result.

This item shall be rated as follows:

If fences, artificial or natural obstructions, control blowing litter and the landfill and surrounding areas are routinely policed to minimize litter at all times.
4 points

If some control of blowing litter is exercised and all litter at the landfill and/or immediate area is policed at a minimum interval of once each twenty-four hours.
2 points

No control of blowing litter is exercised and the site or the immediate area is commonly littered.
0 points

ITEM 10: Spreading and Compacting of Refuse. Refuse shall be spread and compacted in shallow layers, not exceeding a depth of two feet of compacted material.

Reason. Successful operation of a sanitary landfill depends upon adequate compaction of the refuse. Settlement will be excessive and uneven when the refuse is not well compacted. Such settlement permits the ingress and egress of insects and rodents and severely limits the usefulness of the finished area.

Compaction is best initiated by spreading the refuse evenly in shallow layers rather than placing the material in a single deep lift. Further compaction is provided by the repeated travel of landfill equipment over the layers and, if necessary, by the use of special compacting equipment. Additional compaction also can be achieved by routing collection trucks so that they travel repeatedly over the covered portion of the fill. These procedures result in the greatest compaction and the least ultimate settlement, providing the most useful finished fill and best utilizing the capacity of the site.

This item shall be rated as follows:

If refuse additions are spread evenly by repeated passages of landfill equipment, each layer being compacted thoroughly to a depth not to exceed two feet.
5 points

If the refuse is spread but not adequately compacted into a solid mass.
2 points

If the refuse is neither spread nor compacted.
0 points

ITEM 11: Depths of Cells in Fill. Individual cells in sanitary landfills shall be no greater than eight feet in thickness.

Reason. The total depth of a landfill is governed by the characteristics of the site, the desired elevation of the completed fill, and good engineering practice. Construction of a fill in well-compacted cells of not more than eight feet each in thickness minimizes settlement, surface cracking, odor release, and offers increased fire protection. Fills using cells thinner than eight feet do not generally make maximum use of available land, but provide for earlier reuse of the site.

This item shall be rated as follows:

If fill is constructed of properly spread and compacted cells to a total thickness of eight feet or less.
5 points

If fill is constructed of properly spread and compacted cells to a total thickness more than eight feet but less than 12 feet.
2 points

If fill is constructed without compaction or in cells exceeding 12 feet in thickness.
0 points

ITEM 12: Daily Cover. A uniform compacted layer of at least six inches of suitable cover material shall be placed on all exposed refuse by the end of each working day.

Reason. Daily covering of the refuse is necessary to prevent fly and rodent attraction, blowing litter, production of odors, fire hazards, and an unsightly appearance. Fly emergence generally is prevented by six inches of compacted soil. Daily covering divides the fill into "cells" that limit the spread of fires within the fill.

This item shall be rated as follows:

If the cover material has the working properties of "sandy loam" as classified by the U. S. Department of Agriculture (USDA) and is compacted in an unbroken, uniform layer no less than six inches in depth.
20 points

If the cover material is a soil having working properties less than the sandy loam specified and is well-maintained as above.
15 points

If the cover material is inert incinerator residue and is thoroughly compacted to a uniform depth of no less than six inches and there are no rodent, insect, or odor problems resulting.
10 points

If no daily cover is performed (any exposure of refuse after the working day), or if daily cover is improperly applied (not compacted; unsuitable material; nonuniform depth or depth less than six inches; voids in cover; or insect or rodent ingress or egress).
0 points

ITEM 13: Intermediate Cover. In all but the final lift of a landfill, a layer of suitable cover material, compacted to a minimum uniform depth of one foot shall be placed daily on all surfaces of the fill except those where operation will continue on the following working day.

Reason. More than one foot of soil cover might be wasteful in a landfill in which there is a clear intention to provide at least one additional lift within one year. Under such circumstances, a one-foot layer of properly compacted and maintained cover will prevent health hazards or nuisances until the next lift is placed.

This item shall be rated as follows:

If the intermediate cover material has the working properties of sandy loam as defined by USDA and is compacted to a minimum uniform depth of one foot.
4 points

If the intermediate cover material is a soil having working properties less than the sandy loam specified and is compacted to a minimum uniform depth of one foot.
3 points

If the intermediate cover material is inert incinerator residue compacted to a minimum uniform depth of one foot.
1 point

If no intermediate cover is applied or if it is improperly constructed causing odor and vector problems.
0 points

ITEM 14: Final Cover. A uniform layer of suitable cover material compacted to a minimum depth of two feet shall be placed over the entire surface of each portion of the final lift, not later than one week following the placement of refuse within that portion.

Reason. A minimum final cover of two feet of compacted suitable cover material will prevent emergence of insects from the compacted refuse, minimize escape of odors and gases, and prevent rodent burrowing. This cover also provides an adequate bearing surface for vehicles, and sufficient thickness for cover integrity in the event of settling or erosion.

This item shall be rated as follows:

If the final cover material has the working properties of sandy loam as classified by the USDA and is compacted in a uniform unbroken layer with a minimum depth of two feet.
4 points

If the final cover material is a soil having working properties less than the sandy loam classification, compacted in uniform unbroken layer with a minimum depth of two feet.
3 points

If the final cover is incinerator residue; if no cover is provided or if the cover provided is improperly constructed, resulting in odor, rodent and insect vector problems.
0 points

ITEM 15: Equipment Maintenance Facilities. Provisions shall be made for the routine operational maintenance of equipment at the landfill site and for the prompt repair or replacement of landfill equipment.

Reason. Equipment breakdowns of a day or more result in the accumulation of uncovered refuse (as in an open dump) with all the attendant health hazards or nuisances. Systematic, routine maintenance of equipment reduces repair costs, increases life expectancy, and helps to prevent breakdowns that interrupt landfill operations. In the event of breakdown, prompt repair of equipment, or immediate procurement of standby equipment will materially reduce down time. Prompt repair of equipment and availability of standby equipment insures continuity of operations.

This item shall be rated as follows:

If complete maintenance facilities and personnel are provided at the disposal site or if standby equipment of suitable capacity and capability is available at all times.
2 points

If facilities for routine maintenance are available on-site and if adequate provisions for major maintenance and repair have been made.
1 point

If maintenance facilities and repair provisions are not provided or are inadequate; if equipment is inoperable or of limited capability because of poor maintenance.
0 points

ITEM 16: Sewage Solids or Liquids and Other Hazardous Materials. Sewage solids or liquids (septic tank or cesspool pumpings and sewage sludge and grit), and other hazardous materials shall be disposed of in a sanitary landfill only if special provisions are made for such disposal.

Reason. Sewage solids or liquids are infectious and create health hazards if not properly handled. Other materials, including oil sludges, waste chemicals, magnesium shavings, and empty insecticide containers, may also present special hazards. Unless properly handled, these wastes can be dangerous to landfill employees. When the design of sanitary landfill includes special provisions for disposal of hazardous materials, they can be disposed of safely and need not be excluded.

This item shall be rated as follows:

If suitable procedures are established and followed for disposal of hazardous materials.
2 points

If all hazardous materials are excluded from the fill.
1 point

If hazardous materials are accepted without provision for suitable disposal.
0 points

ITEM 17: Large or Bulky Items. Special provisions shall be made for the disposal of large, heavy, or bulky items at small landfills or at landfills operated with light equipment.

Reason. Some special method may be necessary for the disposal of such large items as car bodies; refrigerators; water heaters; large tires; some demolition wastes; and large tree stumps, trunks, and branches. Some of these items are noncombustible, and it may not be advisable or permissible to burn some of the combustible materials. At landfills with heavy equipment, such items generally can be handled routinely with other refuse; however, special provisions are necessary to incorporate large or bulky items into the fill at small landfills or at landfills operated with light equipment.

This item shall be rated as follows:

If approved special techniques are employed to dispose of bulky items and all disposal is done in an orderly and neat manner or if adequate disposal of bulky items can be obtained in the routine filling operation.
3 points

If bulky items cannot be handled or are handled improperly.
0 points

ITEM 18: Burning. No garbage or refuse containing garbage shall be burned at the sanitary landfill. Burning of select materials shall be severely restricted, and shall be conducted only with the permission of the appropriate authorities.

Reason. Garbage cannot be burned without nuisance except in high-temperature incinerators. Any other method of combustion creates odors, air pollution, and fire and safety hazards. Such burning adversely affects public acceptance of the operation and proper location of future sanitary landfill sites. Controlled burning of certain combustible materials not readily incorporated in the fill, such as lumber, brush, and tree stumps, may provide a satisfactory means of disposal of these materials at some isolated sites.

This item shall be rated as follows:

If no burning is allowed at any time.
3 points

If burning of refuse is uncontrolled or is performed without knowledge of, or permission by the local authority.

0 points

ITEM 19: Salvage. When salvaging is permitted, it shall be so organized that it will not interfere with prompt sanitary disposal of refuse nor create unsightliness or health hazards. Scavenging shall not be permitted.

Reason. Nothing can be tolerated that interferes with prompt sanitary disposal of refuse. When improperly conducted, salvaging delays landfilling operations and creates insanitary conditions. The accumulation of salvage at the disposal site often results in vector problems and unsightliness, which are deterimental to public acceptance of the operation. Scavenging is an unhealthy, aesthetically-objectionable practice that interferes with the orderly and efficient operation of a landfill.

This item shall be rated as follows:

If no salvaging is allowed.

3 points

If salvaging is controlled and all salvage is removed from the site at the end of each working day.

1 point

If scavenging is allowed or if salvage is allowed to accumulate beyond the end of the working day.

0 points

ITEM 20: Vector Control. Conditions unfavorable for the production of insects and rodents shall be maintained by carrying out routine landfill operations promptly in a systematic manner. Supplemental vector control measures shall be instituted whenever necessary.

Reason. While operation of a sanitary landfill according to these standards will reduce insect and rodent problems to a minimum, any lapse in proper operating procedures may result in attraction and rapid production of insects and rodents. Supplemental vector control measures may occasionally be necessary to prevent health hazards or nuisances.

This item shall be rated as follows:

If vector control is not needed.

2 points

If vector control is promptly supplied when conditions warrant such control.

1 point

If vector control is needed or is not promptly furnished.

0 points

ITEM 21: Dust Control. Suitable control measures shall be taken wherever dust is a problem.

Reason. Excessive dust slows operation, creates accident hazards and aesthetic problems, and may cause eye irritation or other injury to landfill personnel.

This item shall be rated as follows:

If dust control is not required or if suitable control measures are applied as needed.

2 points

If dust control is applied as needed but is not effective.

1 point

If dust control is necessary and is not applied.

0 points

ITEM 22: Placement in Ground Water. The depositing of refuse in locations where continuous or intermittent contact occurs between refuse and the ground water table shall be avoided.

Reason. Gross contamination of underground water supplies can occur in areas where refuse is in intimate contact with the water table.

This item shall be rated as follows:

If the refuse is placed where the ground water table will not come in contact with the refuse, as determined by competent engineering authority.

5 points

If intermittent contact with the ground water table may occur but adequate provisions have been made to monitor the adjacent ground water quality and make appropriate operational changes, if indicated.

3 points

If refuse is deposited in water or where ground water may come in intermittent contact with the refuse and no provisions for monitoring have been made.

0 points

ITEM 23: Drainage of Surface Water. The entire site, including the fill surface, shall be graded and/or provided with drainage facilities to minimize run-off into and onto the fill, prevent erosion or washing of the fill, drain off rain water falling on the fill, and prevent the collection of standing water. The final surface of the fill shall be graded to a slope of at least one percent, but no surface slope shall be so steep as to cause erosion of the cover.

Reason. Run-off from lands adjacent to the fill and rain falling on the fill may, unless diverted, percolate into the fill and pollute the ground or surface water with the leachate. The cover may be removed by erosion of the fill and standing water may permit mosquito breeding or may interfere with access, unloading, compacting or placement of cover.

This item shall be rated as follows:

If surface waters are diverted from the fill and no permanent ponding occurs.

6 points

If only occasional scouring or ponding of surface water occurs.

4 points

If surface drainage is not controlled or is inadequately controlled.

0 points

ITEM 24: Final Grading. The completed fill shall be graded to serve the purpose for which the fill is ultimately planned. The surface drainage shall be consistent with the surrounding area. The finished construction shall not in any way cause interference with proper drainage on adjacent lands nor shall the finished fill concentrate run-off waters into adjacent areas. Seeding of finished portions with appropriate grasses to promote stabilization of the cover shall be performed.

Reason. To promote sanitary landfill as an acceptable refuse disposal practice, and to enhance the obtainment of appropriate future sites, it is important that the fill not only be operated in an acceptable manner, but also that the completed landfill blend with its surroundings and, if possible, be utilized for some purpose.

This item shall be rated as follows:

If completed portions of the landfill are properly graded and permit proper drainage.

4 points

If finished portions evidence some ponding uneveness or scouring correctable by proper maintenance.

2 points

If finished surfaces are not smooth and are improperly drained.

0 points

ITEM 25: Animal Feeding. All animals shall be excluded from the site.

Reason. Consumption of raw garbage by hogs is an important factor in the transmission of trichinosis in man, as well as trichinosis, hog cholera, and vesicular exanthema in hogs, therefore, hogs should be excluded from landfills. Domestic or wild animals will interfere with the landfill operation. Appropriate fencing will exclude animals and prompt covering of refuse will make the site less attractive for gulls and other birds.

This item shall be rated as follows:

If no animal feeding is allowed and proper fencing is installed, if needed.

2 points

If any animal feeding is allowed.

0 points

ITEM 26: Accident Prevention and Safety. Employees shall be instructed in the principles of first aid and safety and in the specific operational procedures necessary to prevent accidents, including limitation of access. Accident precautionary measures shall be employed at the site. An adequate stock of first-aid supplies shall be maintained at the site.

Reason. The use of heavy earth-moving equipment, the maneuvering of collection trucks and other vehicles, and the infectious, explosive or flammable items that may be in the refuse can create accident hazards at landfills. The remote location of some landfills makes it particularly important that personnel be oriented to accident hazards, trained in first-aid, and provided first-aid supplies. For reasons of safety, access should be limited to those authorized to use the site for the disposal of refuse.

This item shall be rated as follows:

If employees are given periodic safety training; and if an adequate first-aid kit, and at least one employee trained in first-aid, is available on the site at all times.
2 points

If employees are given periodic safety training; and if an adequate first-aid kit is available at the site and trained first-aid assistance is available at a location within 3 miles of the site to which appropriate communication is available.
1 point

If employees are not given periodic safety training; or if neither an on-site first-aid kit nor trained first-aid assistance (within 3 miles) is available.
0 points

If no positive accident prevention program is employed or if unsafe practices are carried on at the site.
Deduct 5 points

ITEM 27: Operational Records and Plan Execution. A daily log shall be maintained by the sanitary landfill supervisor to record operational information, including the type and quantity of refuse received, the portion of the landfill used, and any deviations made from the plans and specifications. A copy of the original plans and specifications, a copy of the daily log, and a plan of the completed landfill shall be filed with the local governmental agency responsible for maintaining titles to land.

Reason. Completed landfill sites are ultimately utilized for a variety of purposes. When the ultimate use of the site is known beforehand, the landfill operation can be planned so that suitable building sites, roads, and utilities, can be provided. Final grades can be established and allowances made for landscaping and adequate drainage. A record of the construction of the landfill is necessary for the most efficient utilization of the completed landfill site and for the prevention of health hazards or nuisances.

This item shall be rated as follows:

If complete records are maintained as delineated above.
2 points

If the records kept are considered adequate for the intended use of the fill.
1 point

If there are no records.
0 points

If the sanitary landfill deviates materially from the approved plan in such a manner as to produce an unsatisfactory sanitary landfill (during operation or upon completion) or if a sanitary landfill is constructed or operated without planning so as to elicit valid adverse comment from the adjacent property owners and/or governmental officials.
DEDUCT
20 points

Suggested Method of Applying the Point Ratings.

A summation of the points awarded for each of the twenty-seven items yields a possible score of up to 100. The sanitary condition of the fill should be maintained at all times and for this reason a high score must be attained on certain items in order to assure the proper degree of health protection.

A suggested method of evaluating the numerical ratings is as follows:

A-Rated Sanitary Landfill - Suitable for well-developed areas such as residential and commercial zonings.

The following items must score as follows:

Item 9	(Blowing Litter)	4
Item 12	(Daily Cover)	15
Item 13	(Intermediate Cover)	3
Item 14	(Final Cover)	3
Item 18	(Burning)	3
Item 22	(Placement in Ground Water)	5
Item 23	(Drainage of Surface Water)	4

Total rating must equal 85 or more points.

B-Rated Sanitary Landfill - Suitable for areas of industrial zonings.

The following items must score as follows:

Item 9	(Blowing Litter)	2
Item 12	(Daily Cover)	10
Item 13	(Intermediate Cover)	1
Item 14	(Final Cover)	3
Item 18	(Burning)	3
Item 22	(Placement in Ground Water)	3
Item 23	(Drainage of Surface Water)	4

Total rating must equal 70 or more points.

C-Rated Sanitary Landfill - Suitable for remote or rural areas (to be determined locally - approximate conditions, less than 500 persons per square mile).

The following items must rate as follows:

Item 9	(Blowing Litter)	2
Item 12	(Daily Cover)	10
Item 13	(Intermediate Cover)	1
Item 14	(Final Cover)	3
Item 18	(Burning)	3
Item 22	(Placement in Ground Water)	3
Item 23	(Drainage of Surface Water)	4

Total rating must equal 55 or more points.

The closer a sanitary landfill is to human habitation, the more stringently the landfill must adhere to good practice. In order to satisfy public demands, the sanitary landfill ratings have been developed to indicate the quality of sanitation landfills must maintain to operate in the three principle types of areas. In many cases, sanitary landfills may attain a rating appropriate for the area in which they are located, through modifications to achieve adequate scores on certain items.

EXHIBIT II -1 ELM TREE STATISTICAL INFORMATION

I GENERAL

A. Area

1. SMSA

a.	Square Miles	1,530
b.	Acres	997,120

B. Mean Tree Measurements (Average of Samples Surveyed)

1. Definitions

    a. 100% Density - Total estimated material with same density as the log or trunk.
    b. Wet Weight - Green log or foliage material.
    c. Dry Weight - Oven-dried material, 0% moisture.

2.	Average Diameter - Inches	23
3.	Average Overall Height - Feet	25

4. Log or Bole (Limb Free Trunk) Volumes

a.	Length @ 50% of average overall height-feet	12.5
b.	Average diameter - Inches	23.
c.	Volume cubic feet (cubic yards)	36 (1.3)

5. Crown (upper foliage and limbs) absolute volumes (equal to bole)

a.	Volume Cubic Feet (Cubic Yards)	36 (1.3)

6. Total Volume

a.	Cubic Feet (cubic yards)	72 (2.6)

7. Weights

a.	Pounds per cubic feet, wet	54.3
b.	Pounds per cubic feet, dry	34
c.	Bole, wet (54.3 x 36) -pounds (tons)	1,955 (.97)
d.	Crown, wet (54.3 x 36) - pounds (tons)	1,955 (.97)
e.	Total tree, wet (54.3 x 72) -pounds(tons)	3,910 (1.94)
f.	Total tree, dry (34 x 72)-pounds(tons)	2,448 (1.2)
g.	Ash residue (2.2% of dry wt.)-pounds	54

C. Timberland (Acres)

1. Douglas County

a.	Private	53,416
b.	Public and semi-public	9,247
c.	Parks and recreation	3,726
	Total	66,389

2. Sarpy County

a.	Private	5,593
b.	Public and semi-public	4,072
c.	Parks and Recreation	1,572
	Total	11,237

3. Pottawattamie County

a.	Private	13,768
b.	Public and semi-public	6,545
c.	Parks and recreation	2,607
	Total	22,920

4.	Total SMSA Timberland - Acres	100,546

D. Average Acre Density (Estimated)

1.	Private - Per acre	2.5
2.	Public and semi-public - per acre	5.8
3.	Parks and recreation - per acre	40.0

II. NUMBER OF ELM TREES (estimated)

A. Metropolitan Area

1. Douglas County

a.	Private	133,540
b.	Public and semi-public	53,633
c.	Parks and recreation	149,040
	Total	336,213

2. Sarpy County

a.	Private	13,983
b.	Public and semi-public	23,618
c.	Parks and recreation	62,880
	Total	100,481

3. Pottawattamie County

a.	Private	34,420
b.	Public and Semi-public	37,961
c.	Parks and recreation	104,280
	Total	176,661

4. Metropolitan Area Disposal Problem Trees

a.	Original Total elm, 100%	613,355
b.	Down and disposed, 1964-1968, 35%	214,674
c.	Remaining standing, 1968, 65%	398,681

5.	Total Metropolitan Area Disposal Problem Trees	398,681

6. Number of Immediate and Rural Area Disposal Problem Trees.

a.	Total Metropolitan Area Disposal Problem trees -	398,681
b.	Estimated continued on-site disposal of rural or remote areas, 23% of total -	91,697
c.	Total immediate area disposal problem trees -	306,984

7. Total Metropolitan Area Elm Tree Weight

a.	Immediate area (1.94 Tons x 306,984 trees) - tons	595,549
b.	Rural or remote area (1.94 tons x 91,697 trees) - tons	177,892
c.	Total - Tons	773,441

EXHIBIT II-2 - DEVELOPMENT OF UNIT WEIGHTS

A. GENERAL. Unit weights are intended to be typical of materials "As Delivered" to the disposal site, but often loads are mixed, with two or more materials in each load. Seldom is there only one material on a load, except in the case of certain material classes which are intended to include a variety of materials peculiar to the origin or type of waste.

It was often impractical to define all components of a load. For instance, a load of glass from a bottling company also contained quantities of paper, cardboard, wood, tin cans, etc. Therefore, loads were estimated as to the percentage of major components, on a volumetric basis.

Weighing of waste as delivered to the site was done in order to obtain unit weight data on materials for which there was no other information and to substantiate data available from other sources. An attempt was made to select loads for weighing which were typical for that class of material, although some weighing of mixed loads was required. Mixed loads were analyzed on the basis of component parts to check the total weight of the load against known or assumed average weights of two or more components.

Many material densities were assigned based upon specific knowledge of the materials involved, while others are a matter of general knowledge. Past experience has provided knowledge of such items as paunch manure, sewage solids, street sweepings, rubber manufacturing wastes, cinders, fly ash and cement manufacturing wastes. The bulk density of various materials are general knowledge, including dirt, gravel rock, oils, grain, fruits and vegetables, furniture and appliances.

B. WEIGHING PROGRAM. Three approaches to weighing of refuse materials were taken. These are discussed in the following paragraphs.

1. City Collected Wastes - All domestic kitchen waste disposed of at the Council Bluffs Landfill was collected by the City of Council Bluffs in packer trucks. As a part of the refuse collection study, a record was made of the volume of refuse collected by the City of Council Bluffs packer trucks for at least one week on each of the 6 routes. From this date, unit weights were determined by weighing a number of loads and averaged to determine a unit weight for material Class 40, "Garbage and Kitchen Wastes, Domestic." The average density was 626 lb/c.y., with a maximum of 750 lb/c.y. and a minimum of 500 lb/c.y. A value of 626 lb/c.y. packed or 313 lb/c.y. loose was assigned to material Class 40. This value was also assigned to material Class 41, "Garbage and Kitchen Wastes, Commercial."

2. Weighing of Private Haulers - Private refuse haulers cooperated in obtaining unit weight data for several classes of material, particularly the "paper and cardboard" and "mixed trash and refuse" classes. There is considerable variation in the unit weight of these wastes depending upon whether

they are collected in packer trucks, open body trucks, trailers, or pickups. Numerous loads of both packer and non-packer type trucks were weighed and recorded the corresponding volumes.

For material Class 42, "Mixed Trash and Refuse (including Garbage)," weighing of packer and open body trucks produced the following results:

	No. of Loads	Volume	Weight	Ave. Unit Weight
Open Truck	35	241 CY	74,310 lbs.	308 lb/c.y.
Packer Truck	357	5,911 CY	3,650,310 lbs.	617 lb/c.y.

The unit weight assigned to material Class 42 "Mixed Trash and Refuse (including Garbage)" was 308 lb/c.y. for open body trucks and 616 lb/c.y. for packer trucks.

For material Class 43, "Mixed Trash and Refuse (No Garbage)," weighing of packer and open body trucks produced the following results:

	No. of Loads	Volume	Weight	Ave. Unit Weight
Open Truck	84	716 CY	166,710 lbs.	231 lb/c.y.
Packer Truck	75	1,200 CY	564,000 lbs.	470 lb/c.y.

The unit weight assigned to material Class 43, "Mixed Trash and Refuse (No Garbage)" was 232 lb/c.y. for open body trucks and 464 lb/c.y. for packer trucks.

For Material Class 50, "Paper and Cardboard," weighing of packer and open body trucks produced the following results:

	No. of Loads	Volume	Weight	Ave. Unit Weight
Open Truck	91	965 CY	178,160 lbs.	183 lb/c.y.
Packer Truck	24	384 CY	138,240 lbs.	360 lb/c.y.

The unit weight assigned to material Class 50, "Paper and Cardboard," was 185 lb/c.y. for open body trucks and 370 lb/c.y. for packer trucks.

The 2 to 1 compaction ratio of packer trucks to open trucks established in material classes 40, 41, 42, 43 and 50 is believed to hold true for each of these material classes. On that basis, open truck unit weights of 313 lb/c.y. were assigned to material Classes 40 and 41, 308 lb/c.y. for material class 42, 232 lb/c.y. for material Class 43, and 185 lb/c.y. for material Class 50.

3. Packer Truck Density - For the five material Classes 40, 41, 42, 43 and 50, the 2 to 1 compaction ratio of packer to open truck density was incorporated into the computer program for determining the weight of material delivered to the disposal site. Unit weights listed in the table giving seasonal and compaction factors and unit weights are for open trucks. When these material classes were delivered in packer trucks, both the unit weight and the compaction factor were automatically doubled. This eliminated the need for anticipating the ratio of packer trucks to open trucks in each material class and permitted the use of two unit weights for these materials rather than a single weighted average based on an anticipated ratio of truck type.

4. Random Weighing. The third approach to load weighing was random weighing of typical loads observed at the landfill sites. This was used exclusively for the demolition and tree waste categories, and also for other materials.

C. COMPACTION FACTORS. Compaction factors were determined, based upon the anticipated density of the material in the fill as compared to the density as delivered to the disposal site. For instance, paper, cardboard, and general mixed rubbish should compact in the fill to approximately 600 lb/C.Y. If paper and cardboard are delivered to the disposal site in an open body truck at 185 lb/C.Y., the compaction factor is determined to be 185÷600 = 0.3. If the same material is delivered in a packer truck at 370 lb/C.Y., the compaction factor is 370÷600 = 0.6. Some materials will have a greater density delivered to the site than the compacted density of paper and other rubbish. In the case of liquids and semi-solids, little or no increase in the fill volume may be required, therefore a small compaction factor is used. Heavy granular and bulky wastes were evaluated in terms of the anticipated volume reduction due to spreading, compacting and mixing with other materials in the landfill for assigning compaction compaction factors.

EXHIBIT III - 1
Page 1

SITE SIMULATION NO. 65

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SIMULATION NUMBER   65

SITE  1 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00

SITE  3 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00

SITE  5 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00


    PACKER TRUCK                                                DUMP TRUCK

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST     SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1       668       350         49       4.35       6.35          1        51        59         20       2.75       3.72
  2         0         0          0       0.00       0.00          2         0         0          0       0.00       0.00
  3      2344      1764        374       5.21       6.73          3      1376      1312        243       4.09       6.75
  4         0         0          0       0.00       0.00          4         0         0          0       0.00       0.00
  5      3419      1652        344       5.66       5.32          5      1306      1529        409       4.07       4.67
  6         0         0          0       0.00       0.00          6         0         0          0       0.00       0.00
  7         0         0          0       0.00       0.00          7         0         0          0       0.00       0.00

    VAN                                                         LIGHT TRAILER

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST     SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1        56        41         15       2.96       2.08          1         0         0          4       3.24       1.00
  2         0         0          0       0.00       0.00          2         0         0          0       0.00       0.00
  3       402       141         44       3.16       2.31          3        12         8         20       2.51       1.00
  4         0         0          0       0.00       0.00          4         0         0          0       0.00       0.00
  5       476       164        144       3.37       1.94          5        62        54         87       3.57       1.04
  6         0         0          0       0.00       0.00          6         0         0          0       0.00       0.00
  7         0         0          0       0.00       0.00          7         0         0          0       0.00       0.00

    HEAVY TRAILER                                               FLAT BED OR STAKE

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST     SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1        43         4          3       6.25       4.46          1       125       121         31       3.06       4.87
  2         0         0          0       0.00       0.00          2         0         0          0       0.00       0.00
  3       142        81         17       5.88       4.64          3       792       584        294       3.11       3.58
  4         0         0          0       0.00       0.00          4         0         0          0       0.00       0.00
  5       316        93         24       5.43       3.47          5      1298       882        273       3.27       4.06
  6         0         0          0       0.00       0.00          6         0         0          0       0.00       0.00
  7         0         0          0       0.00       0.00          7         0         0          0       0.00       0.00

    PICK-UP TRUCK                                               AUTO OR STATION WGN

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST     SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1        83        54         52       2.35       1.28          1         3         2         17       2.50       0.00
  2         0         0          0       0.00       0.00          2         0         0          0       0.00       0.00
  3       411       314        464       2.73       1.12          3        18        14        182       1.69       0.00
  4         0         0          0       0.00       0.00          4         0         0          0       0.00       0.00
  5       444       714        418       3.07       1.03          5        51        36        452       3.42       0.00
  6         0         0          0       0.00       0.00          6         0         0          0       0.00       0.00
  7         0         0          0       0.00       0.00          7         0         0          0       0.00       0.00

    TRANSFER VEHICLE                                            OTHER VEHICLES

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST     SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
  1        24         4          1       4.80       5.80          1        18        80          8       7.24      12.44
  2         0         0          0       0.00       0.00          2         0         0          0       0.00       0.00
  3         0         0          0       0.00       0.00          3         0         0          0       0.00       0.00
  4         0         0          0       0.00       0.00          4         0         0          0       0.00       0.00
  5         0         0          0       0.00       0.00          5         7        11          7       4.66       6.78
  6         0         0          0       0.00       0.00          6         0         0          0       0.00       0.00
  7         0         0          0       0.00       0.00          7         0         0          0       0.00       0.00


TOTALS FOR ALL VEHICLES

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST PCT Y   PCT T
  1       415       782        263     785.54     881.87      6.12    6.89
  2         0         0          0       0.00       0.00      0.00    0.00
  3      5144      4214       1444    5102.83    5290.44     40.50   41.41
  4         0         0          0       0.00       0.00      0.00    0.00
  5      7110      5267       2752   10143.46    6613.37     53.38   51.70
  6         0         0          0       0.00       0.00      0.00    0.00
  7         0         0          0       0.00       0.00      0.00    0.00

        13320     10188       4460   16031.88   12785.69
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SITE SIMULATION NO. 65

VEHICLE DISTRIBUTION BY DISPOSAL SITES

	VEHICLE TYPE	GEO AREA	NO. OF VEHICLES	CUBIC YARDS	TONS	AVERAGE FEES
SITE 1	1	25	40	275	217	9.84
		26	28	169	130	11.93
		38	1	4	3	10.84
	2	25	15	35	42	5.75
		26	4	17	17	9.68
		32	1	4	*	4.60
	3	25	5	11	7	3.60
		26	9	35	18	6.05
		32	2	4	2	4.09
	4	26	1	0	*	4.40
		34	1	0	*	3.75
	5	25	2	43	8	11.09
	6	25	12	52	32	5.17
		26	7	35	54	13.22
		32	5	11	7	4.68
		37	7	27	28	9.73
	7	24	2	3	1	4.26
		25	24	35	36	3.17
		26	15	17	12	4.17
		30	1	0	*	1.50
		32	7	6	6	3.62
		37	1	1	*	5.16
		38	2	1	*	4.87
	8	25	12	2	*	1.59
		26	11	1	*	3.15
		32	12	0	*	2.53
		37	2	0	*	4.16
	9	26	1	22	4	14.80
	10	25	8	10	85	14.68
SITE 3	1	7	2	7	6	11.34
		8	26	140	105	16.25
		9	2	12	8	9.27
		15	21	112	82	8.26
		16	78	447	331	9.84
		17	68	402	289	12.36
		20	74	905	738	17.31
		21	39	267	161	8.50
		22	11	57	42	7.76
	2	8	4	9	8	8.49
		10	1	1	*	3.66
		15	5	9	12	4.09
		16	30	88	111	7.87
		17	149	1113	473	13.05
		20	16	31	31	8.67
		21	17	42	46	5.73
		22	26	85	130	8.99
	3	8	7	0	*	6.09
		9	1	1	*	3.63
		15	4	11	7	3.10
		16	9	12	5	3.53
		17	33	159	80	7.09
		20	23	74	53	6.14
		21	13	25	11	2.97
		22	4	4	4	3.16
	4	8	1	1	*	5.77
		9	1	0	*	3.50
		10	1	1	*	3.02
		15	1	0	*	1.78
		16	3	2	2	3.37
		17	3	2	1	4.82
		20	3	1	*	4.08
		21	3	1	*	2.82
		22	4	4	2	2.70
	5	8	1	20	8	18.81
		16	2	3	2	5.53
		17	4	47	47	13.43
		20	2	14	3	7.59
		21	3	4	2	4.27
	6	7	1	10	12	20.05
		8	15	45	39	8.35
		9	1	3	1	4.32
		10	2	11	12	9.68
		12	1	1	*	5.45
		14	1	6	7	9.65
		15	8	30	32	5.78
		16	29	100	76	5.81
		17	60	257	149	7.17
		20	14	168	111	6.95
		21	35	103	83	4.90
		22	13	58	81	7.62
	7	2	1	1	*	6.77
		3	2	2	*	5.14
		4	1	1	*	3.80
		7	1	1	*	5.25
		8	15	18	15	5.75
		9	2	1	*	3.30
		11	1	2	2	3.86
		13	3	1	*	3.05
		14	2	0	*	1.49
		15	29	23	23	1.71
		16	72	80	55	3.22
		17	125	153	104	4.66
		20	[illegible]	77	65	4.08
		21	32	29	19	2.70
		22	14	21	22	3.55
		118	1	1	3	8.71
	8	8	3	0	*	4.48
		9	8	1	2	2.30
		10	2	0	0	1.88
		13	1	0	*	2.05
		14	3	0	*	.89
		15	40	3	2	.71
		16	42	4	3	2.22
		17	11	1	*	3.57
		20	15	2	1	2.87
		21	32	3	2	1.70
		22	23	4	3	1.57
		118	1	0	*	5.52
SITE 5	1	18	8	41	31	12.30
		19	162	903	668	11.08
		27	40	250	169	10.59
		28	65	423	332	8.88
		29	1	4	2	10.93
		30	1	5	3	7.97
		31	2	10	6	11.22
		39	12	45	36	9.17
		137	2	17	9	13.62
		138	28	200	107	12.27
		139	58	549	295	11.63
		142	2	15	9	8.55
		143	1	6	4	6.45
	2	18	32	50	28	6.09
		19	144	665	583	8.93
		28	55	131	152	5.16
		29	1	6	7	13.70
		39	1	0	0	5.04
		137	6	15	27	11.46
		138	74	330	341	10.31
		139	49	318	386	9.89
		142	2	13	4	7.49
	3	18	1	1	*	5.28
		19	117	368	158	5.16
		27	5	20	12	5.93
		28	13	22	10	2.43
		30	4	4	8	4.56
		31	1	1	*	5.25
		34	1	2	1	4.58
		41	1	2	*	5.09
		137	2	4	3	6.84
		138	22	66	52	6.83
		139	23	76	57	6.78
		142	1	0	*	5.17
		143	1	5	2	3.41
	4	18	1	1	*	5.00
		19	8	9	8	4.37
		27	1	1	*	3.84
		29	1	2	2	2.44
		31	1	0	*	5.01
		40	1	0	*	3.73
		136	1	1	*	5.77
		137	4	2	8	4.59
		138	36	24	24	4.60
		139	35	22	18	4.67
	5	18	2	5	3	4.79
		19	14	125	44	8.53
		27	1	2	1	6.80
		[illegible]	3	11	6	4.84
		139	4	73	77	16.70
	6	18	2	61	20	7.10
		19	138	659	438	7.42
		27	11	57	28	6.18
		28	54	181	130	6.23
		30	12	59	36	6.37
		31	2	4	1	6.22
		34	13	95	68	8.97
		40	1	4	6	10.04
		137	7	24	17	7.72
		138	24	84	73	7.63
		139	17	84	56	7.65
		142	3	5	4	5.20
	7	18	6	12	8	5.44
		19	120	134	97	4.05
		27	24	26	17	3.67
		28	73	66	61	2.27
		29	6	7	4	4.90
		30	15	22	19	3.91
		31	8	10	10	5.31
		34	1	0	*	3.40
		40	4	7	8	3.59
		136	1	1	*	5.40
		137	45	40	29	5.15
		138	304	307	219	4.38
		139	288	324	238	4.23
		142	9	11	8	2.56
		143	7	7	3	1.46
	8	18	3	0	*	3.76
		19	20	2	1	3.04
		27	7	1	*	2.67
		28	7	0	*	1.26
		29	1	0	*	3.90
		30	6	0	*	2.31
		31	5	0	*	3.72
		34	1	0	*	2.90
		40	2	0	*	2.54
		136	1	0	*	4.40
		137	102	11	6	4.15
		138	165	17	14	3.38
		139	168	18	13	3.21
		140	4	0	*	3.64
		142	1	0	*	1.38
		143	1	0	*	.68
	10	138	2	2	11	11.44

EXHIBIT III - 2 SITE SIMULATION NO. 87
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SIMULATION NUMBER   87

SITE  3 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00

SITE  5 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00

SITE  7 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00


   PACKER TRUCK                                                   DUMP TRUCK

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST       SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00       0.00             1        0         0          0       0.00       0.00
   2        0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
   3     2266      1715        300       6.60       7.16             3      305       391        110       2.92       4.46
   4        0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
   5     2616      1653        360       5.66       5.31             5     1306      1529        409       4.02       4.67
   6        0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
   7      562       393         92       5.62       5.34             7     1122       981        153       4.60       8.02

   VAN                                                            LIGHT TRAILER

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST       SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00       0.00             1        0         0          0       0.00       0.00
   2        0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
   3      181       107         70       2.74       1.96             3        9         6         20       2.67       1.00
   4        0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
   5      576       306        146       3.37       1.98             5       62        54         87       3.57       1.04
   6        0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
   7      169        84         35       3.78       2.90             7        3         2          4       3.07       1.00

   HEAVY TRAILER                                                  FLAT BED OR STAKE

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST       SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00       0.00             1        0         0          0       0.00       0.00
   2        0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
   3       66        15          8       4.83       2.15             3      605       505        159       2.72       3.97
   4        0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
   5      216        80         24       5.64       3.67             5     1290       982        273       3.23       4.06
   6        0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
   7      117 [illegible]       19       6.15       6.92             7      312       200         78       3.38       3.29

   PICK UP TRUCK                                                  AUTO OR STATION WGN

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST       SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00       0.00             1        0         0          0       0.00       0.00
   2        0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
   3 [illegible]       26        276       2.30       1.16             3       20        16        204       2.01       0.00
   4        0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
   5     1000       720        921       4.04       1.03             5       51        36        452       3.42       0.00
   6        0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
   7      173       127        142       3.14       1.12             7        1         0         15       2.95       0.00

   TRANSFER VEHICLE                                               OTHER VEHICLES

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST       SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00       0.00             1        0         0          0       0.00       0.00
   2        0         0          0       0.00       0.00             2        0         0          0       0.00       0.00
   3       22         4          1      11.15       5.00             3       10        80          8       3.51      12.48
   4        0         0          0       0.00       0.00             4        0         0          0       0.00       0.00
   5        0         0          0       0.00       0.00             5        7        11          7       6.66       6.78
   6        0         0          0       0.00       0.00             6        0         0          0       0.00       0.00
   7        0         0          0       0.00       0.00             7        0         0          0       0.00       0.00


TOTALS FOR ALL VEHICLES

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST PCT V   PCT T
   1        0         0          0       0.00       0.00      0.00    0.00
   2        0         0          0       0.00       0.00      0.00    0.00
   3     3766      3074       1157    3505.57    3863.19     28.27   30.22
   4        0         0          0       0.00       0.00      0.00    0.00
   5     7115      5420       2786  -10165.05    6619.81     53.42   51.73
   6        0         0          0       0.00       0.00      0.00    0.00
   7     2639      1860        527    2180.66    2302.69     18.31   18.05

        13320     10182       4460   15851.24   12785.59
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SITE SIMULATION NO. 87

VEHICLE DISTRIBUTION BY DISPOSAL SITES

	VEHICLE TYPE	GEO AREA	NO. OF VEHICLES	CUBIC YARDS	TONS	AVERAGE FEES
SITE 1	1					
		3	2	7	6	11.39
		9	2	12	8	9.27
		13	21	112	82	6.26
		16	74	447	331	9.69
		20	79	409	738	17.41
		21	39	267	161	4.50
		22	11	57	42	7.76
		25	40	275	217	11.57
		26	24	164	130	12.43
	2					
		10	1	1	*	3.66
		13	5	9	12	4.09
		18	29	48	111	7.82
		20	14	31	71	6.67
		21	17	42	46	5.73
		22	26	85	138	8.00
		25	15	35	42	7.03
		26	4	12	17	10.18
		32	1	4	*	6.56
	3					
		4	1	1	*	3.63
		15	4	11	7	3.10
		18	4	12	5	3.53
		20	21	78	53	6.16
		21	13	25	11	2.47
		22	4	4	4	3.16
		25	5	11	7	4.63
		26	9	35	18	6.40
		32	2	4	2	5.67
	4					
		4	1	0	*	3.00
		12	1	1	*	3.02
		15	1	0	*	1.78
		18	1	2	2	3.37
		20	1	1	*	4.08
		21	1	1	*	2.82
		22	4	4	2	2.70
		25	1	0	*	4.75
		32	1	0	*	5.25
	5					
		18	2	1	2	5.63
		20	2	18	3	7.59
		21	1	4	2	4.27
		26	2	61	8	11.86
	6					
		4	1	1	1	4.32
		10	2	11	12	9.68
		12	1	1	*	5.65
		14	1	6	7	9.65
		15	3	30	32	5.76
		16	29	109	76	6.41
		20	32	148	111	8.05
		21	35	113	83	4.90
		22	11	58	81	7.57
		25	12	52	32	6.20
		26	7	35	56	11.57
		32	5	11	7	6.26
		37	4	27	28	10.62
	7					
		2	1	1	*	6.77
		3	2	2	*	5.16
		6	1	1	*	3.48
		8	2	1	*	3.30
		12	1	2	2	3.66
		13	3	1	*	4.05
		14	3	2	*	1.84
		15	23	23	23	1.71
		18	73	40	55	3.22
		20	44	33	65	4.98
		21	32	24	14	2.70
		22	16	21	27	3.55
		24	2	3	1	4.65
		25	24	35	30	4.07
		26	15	17	12	4.47
		32	7	6	6	5.00
		37	1	1	*	6.00
	8					
		4	0	1	2	2.38
		10	2	0	0	1.46
		13	1	0	*	2.05
		14	1	0	*	.49
		15	40	1	2	.71
		16	42	4	3	2.22
		20	14	2	1	2.87
		21	32	3	2	1.70
		22	23	4	1	1.57
		25	12	2	*	2.50
		26	11	1	*	3.45
		32	12	0	*	3.41
		37	2	8	*	5.00
	9					
		26	1	22	4	14.15
	13					
		26	8	10	60	15.95
SITE 2	1					
		14	4	61	31	12.30
		16	167	943	668	11.08
		22	40	253	184	11.54
		26	65	423	332	8.88
		29	1	4	1	10.43
		30	1	5	4	7.57
		31	2	10	6	11.22
		34	1	4	4	11.43
		36	12	40	36	4.17
		137	2	17	3	13.82
		138	26	255	107	12.27
		139	68	534	395	11.83
		142	2	15	4	4.55
		143	1	8	6	6.65
	2					
		14	32	57	28	6.84
		18	167	465	583	8.41
		26	55	131	152	5.18
		29	1	5	7	13.70
		36	1	9	8	5.76
		137	6	16	27	11.46
		138	74	330	341	10.31
		139	49	318	386	9.89
		142	2	10	3	7.60

VEHICLE DISTRIBUTION BY DISPOSAL SITES

	VEHICLE TYPE	GEO AREA	NO. OF VEHICLES	CUBIC YARDS	TONS	AVERAGE FEES
	3					
		14	1	1	*	5.28
		18	117	369	156	5.16
		32	5	29	12	5.93
		26	13	22	10	2.43
		30	4	4	6	4.52
		31	1	0	4	5.25
		34	1	7	3	6.56
		41	1	2	4	5.09
		137	2	4	3	6.46
		138	22	66	52	6.43
		139	23	76	57	6.78
		140	1	0	*	5.17
		143	1	5	2	3.41
	4					
		14	1	1	*	5.38
		15	4	4	*	4.37
		27	1	1	*	3.84
		29	1	2	3	7.44
		31	1	0	*	5.61
		40	1	0	*	3.73
		136	1	1	*	5.77
		137	4	2	4	5.39
		138	16	24	24	4.80
		139	15	22	18	4.47
	5					
		14	2	4	3	8.74
		18	14	125	66	8.57
		27	1	2	1	6.40
		28	4	11	8	6.86
		139	4	73	27	14.70
	6					
		14	4	40	20	7.10
		18	138	654	438	7.42
		27	11	47	28	6.14
		28	36	181	130	6.23
		31	12	54	36	6.17
		33	2	4	3	6.22
		34	15	49	44	4.47
		40	1	5	6	18.09
		137	7	24	17	7.12
		138	24	86	71	7.61
		139	17	84	54	7.65
		142	4	4	4	5.28
	7					
		14	4	12	4	5.64
		18	123	134	47	4.05
		27	26	26	17	3.67
		28	35	44	61	2.27
		29	6	7	4	4.40
		31	13	22	14	4.41
		32	4	13	12	5.31
		40	1	0	4	7.17
		42	4	1	*	4.41
		36	1	0	*	3.41
		41	4	7	4	3.53
		136	5	1	*	5.40
		137	45	40	24	5.15
		138	316	312	219	4.38
		139	284	329	236	4.27
		142	2	11	4	2.54
		143	7	7	1	1.48
	8					
		14	1	8	*	3.78
		18	20	4	1	3.54
		27	4	1	*	3.67
		28	2	0	*	1.26
		29	1	1	*	3.00
		30	4	0	*	2.31
		31	5	0	*	3.72
		32	1	0	*	2.40
		40	2	1	*	3.56
		136	1	0	*	4.60
		137	103	11	4	4.15
		138	145	14	14	3.38
		139	146	14	13	3.71
		140	4	0	4	3.66
		142	1	0	*	1.38
		143	1	0	*	.46
	13					
		139	2	2	11	11.44
SITE 3	1					
		4	26	140	155	7.62
		17	54	402	284	12.16
	2					
		4	4	4	*	4.01
		17	144	1113	473	12.45
	3					
		4	2	0	*	2.26
		17	31	184	85	6.45
	4					
		4	1	1	*	2.23
		17	1	2	1	4.64
	5					
		4	1	25	8	12.57
		17	4	47	47	13.13
	6					
		7	1	11	12	16.04
		4	15	45	34	4.56
		17	80	257	164	7.03
	7					
		7	1	1	*	2.28
		4	15	18	15	2.47
		17	125	153	104	4.54
		118	1	1	3	4.09
	8					
		4	4	0	*	1.13
		17	11	1	*	3.65
		118	1	0	*	2.90

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EXHIBIT III-3
Page 1

SITE SIMULATION NO. 92

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SIMULATION NUMBER   92

SITE  3 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00

SITE  5 DISPOSAL FEE 1.25/TON
        TRANSFER FEE 0.00/TON
        MINIMUM FEE 1.00


     PACKER TRUCK                                                   DUMP TRUCK

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST          SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00      0.00                 1        0         0          0       0.00      0.00
   2        0         0          0       0.00      0.00                 2        0         0          0       0.00      0.00
   3     2748      2168        342       5.28      6.72                 3     1427      1372        263       6.08      6.52
   4        0         0          0       0.00      0.00                 4        0         0          0       0.00      0.00
   5     2614      1653        343       5.45      5.31                 5     1305      1529        404       6.02      6.67
   6        0         0          0       0.00      0.00                 6        0         0          0       0.00      0.00
   7        0         0          0       0.00      0.00                 7        0         0          0       0.00      0.00

     VAN                                                            LIGHT TRAILER

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST          SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00      0.00                 1        0         0          0       0.00      0.00
   2        0         0          0       0.00      0.00                 2        0         0          0       0.00      0.00
   3      350       147        135       3.28      2.27                 3       12         8         26       2.73      1.00
   4        0         0          0       0.00      0.00                 4        0         0          0       0.00      0.00
   5      574       304        144       3.37      1.94                 5       62        54         87       3.57      1.04
   6        0         0          0       0.00      0.00                 6        0         0          0       0.00      0.00
   7        0         0          0       0.00      0.00                 7        0         0          0       0.00      0.00

     HEAVY TRAILER                                                  FLAT BED OR STAKE

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST          SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00      0.00                 1        0         0          0       0.00      0.00
   2        0         0          0       0.00      0.00                 2        0         0          0       0.00      0.00
   3      185        70         14       5.94      4.68                 3      917       705        235       3.23      3.75
   4        0         0          0       0.00      0.00                 4        0         0          0       0.00      0.00
   5      214        47         23       5.43      3.47                 5     1290       882        273       3.23      6.08
   6        0         0          0       0.00      0.00                 6        0         0          0       0.00      0.00
   7        0         0          0       0.00      0.00                 7        0         0          0       0.00      0.00

     PICK UP TRUCK                                                  AUTO OR STATION WGN

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST          SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00      0.00                 1        0         0          0       0.00      0.00
   2        0         0          0       0.00      0.00                 2        0         0          0       0.00      0.00
   3      473       364        414       2.77      1.15                 3       21        16        219       2.14      0.00
   4        0         0          0       0.00      0.00                 4        0         0          0       0.00      0.00
   5     1300       720        421       3.04      1.03                 5       51        36        452       3.42      0.00
   6        0         0          0       0.00      0.00                 6        0         0          0       0.00      0.00
   7        0         0          0       0.00      0.00                 7        0         0          0       0.00      0.00

     TRANSFER VEHICLES                                              OTHER VEHICLES

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST          SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST
   1        0         0          0       0.00      0.00                 1        0         0          0       0.00      0.00
   2        0         0          0       0.00      0.00                 2        0         0          0       0.00      0.00
   3       22         4          1      11.15      5.00                 3       10        80          8       3.51     12.80
   4        0         0          0       0.00      0.00                 4        0         0          0       0.00      0.00
   5        0         0          0       0.00      0.00                 5        2        11          2       4.68      6.78
   6        0         0          0       0.00      0.00                 6        0         0          0       0.00      0.00
   7        0         0          0       0.00      0.00                 7        0         0          0       0.00      0.00


TOTALS FOR ALL VEHICLES

SITE   CU YDS      TONS   VEHICLES  HAUL COST DISPOSAL COST PCT V    PCT T
   1        0         0          0       0.00      0.00      0.00     0.00
   2        0         0          0       0.00      0.00      0.00     0.00
   3     6205      4914       1644    6085.17   6165.87     46.58    48.27
   4        0         0          0       0.00      0.00      0.00     0.00
   5     7115      5227       2756   10165.05   6619.81     53.42    51.73
   6        0         0          0       0.00      0.00      0.00     0.00
   7        0         0          0       0.00      0.00      0.00     0.00

        13320     10144       ****   16250.21  12785.69
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EXHIBIT III - 3
Page 2

SITE SIMULATION NO. 92

VEHICLE DISTRIBUTION BY DISPOSAL SITES

VEHICLE TYPE	GEO AREA	NO. OF VEHICLES	CUBIC YARDS	TONS	AVERAGE FEES
SITE 3					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

VEHICLE DISTRIBUTION BY DISPOSAL SITES

VEHICLE TYPE	GEO AREA	NO. OF VEHICLES	CUBIC YARDS	TONS	AVERAGE FEES
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SITE 5					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Exhibit III-3, Page 2

EXHIBIT III - 4
COST ESTIMATE - SOLID WASTE DISPOSAL FACILITIES
SANITARY LANDFILL SITES 3, 5, and 7

BASIC COST DATA

1. Land Cost

N.W. Site (3) 240 Acres @ $1200 /A =	$288,000	
S.E. Site (5) 480 Acres @ $1000 /A =	480,000	
N.E. Site (7) 160 Acres @ $1000 /A =	160,000	
		$928,000

2. Initial Site Development

N.W. Site (3)	$129,500	
S.E. Site (5)	162,500	
N.E. Site (7)	112,000	
		$404,000

3. Annual Maintenance & Site Development

N.W. Site (3)	$ 25,000	
S.E. Site (5)	30,000	
N.E. Site (7)	15,000	
		$ 70,000

4. Equipment Purchase

Cost of New Equipment, One Time Purchase Only	$462,000

5. Equipment Maintenance, Operation, and Amortization

Item	Hrs/Yr.	Rate/Hr.	Cost/Yr.	
Track Loader	2496	$10.00	$25,000	
Track Loader	3744	15.00	56,200	
Track Loader	2496	7.00	17,500	
Compacter	2496	19.00	47,400	
Dozer	2496	11.00	27,500	
Dozer	2496	9.00	22,500	
Grader	2080	5.50	11,400	
Water Trucks	2496	4.00	10,000	
Tractor Mower	1040	2.00	2,100	
Lowboy Trailer	(100)	3.00	300	
Dump Truck	(100)	5.00	500	
Pickup Trucks	-	-	3,000	
Miscellaneous	-	-	8,400	
Dozer (Spare)	(200)	9.00	1,800	
Wheel Loader (Spare)	(200)	7.00	1,400	
Total	22,440			$235,000

6. Labor

Labor	Hrs/Yr.	Rate/Hr.	Cost/Yr.	
Equip. Operators	21,840	$ 4.25	$92,800	
Laborers	15,184	3.25	49,400	
Foremen	7,488	4.75	35,600	
Gatekeepers	11,232	3.75	42,100	
				$219,900

7. Headquarters & Maintenance Building

Office and Maintenance Building	$80,000	
Office and Maintenance Equipment	50,000	
		$130,000

8. Agency Operation

Salaries	$51,000	
Overhead	14,000	
		$ 65,000

9. Miscellaneous Expense & Contingencies	$ 60,000

ANNUAL COST

1. One-Time Expense
(crf - 6% - 20 Yr. = 0.08718)

Land Cost			$ 928,000	
Initial Site Development			404,000	
Equipment Purchase			462,000	
Hdqtrs. Building			130,000	
	.08718	×	1,924,000	$167,700

2. Recurring Annual Expense

Site Maintenance & Development	$ 70,000	
Equip. M.O. & A.	235,000	
Labor	219,900	
Agency Operation	65,000	
Misc. & Contingency	60,000	
		$649,900

3. Total Annual Cost $817,600

FIXED & VARIABLE ANNUAL COSTS

	Fixed Costs	Variable Costs
Debt Expense	$167,700	-
Annual Development	-	$ 70,000
Equip. M. O. & A.	11,400	223,600
Labor	127,100	92,800
Agency Operation	65,000	-
Misc. & Contingency	-	60,000
	$371,200	$446,400

QUANTITIES FOR UNIT AND TOTAL COSTS

	Ac-Ft.	Tons
1st Yr., 1970	604	723,000
4th Yr., 1973	559	666,000

UNIT AND TOTAL COST OF OPERATION

1. 1st Yr. 1970 604 Ac.-Ft. 723,000 Tons

Fixed Cost	$371,200 - 604 Ac. Ft. =	$615/Ac-Ft.
Variable	$446,400 - 604 Ac. Ft. =	$740/Ac-Ft.
Total	$817,600	$1,355/Ac-Ft.

$817,600 - 723,000 Tons = $1.13/Ton

2. 4th Yr. 1973 559 Ac-Ft. 666,000 Tons

Fixed Cost	$371,200
Variable Cost 559 Ac-Ft. x 740/Ac-Ft.	413,700
	$784,900

$784,900 - 559 Ac-Ft. = $1,405/Ac-Ft.
$784,900 - 666,000 Tons = $1.18/Ton

BOND DEBT SERVICE RESERVE

0.4(167,700) = $67,100

1. 1st Yr. 1970 $67,100 ÷ 723,000 Tons = $ 0.09/Ton
2. 4th Yr. 1973 $67,100 - 666,000 Tons = $ 0.10/Ton

SUMMARY OF UNIT COSTS

Year	Operation $/Ton	Debt Service Reserve Cost $/Ton	Total Unit Cost $/Ton
1970	$1.13	$0.09	$1.22
1973	$1.18	$0.10	$1.28

Exhibit III-4, Page 2

INDIVIDUAL SITE DATA

1. Refuse Accumulation and Land Requirements
1970 - 1st Year of Operation

	Ac-Ft.*	Fill Depth	Fill Area	x1.2	Purchase Area
Site 3	6170	30'	206	247	240A
Site 5	9730	24'	405	487	480A
Site 7	3300	24'	138	165	161A

* Compacted and Seasonally Adjusted

2. Tons of Refuse Per Day, 1970-1995

	Operation, Days/Week	Tons Per Day**
Site 3	6	790-1260
Site 5	6	1200-1750
Site 7	6	410-590

** Seasonally Adjusted

3. Initial Site Development and Costs

	Site 3	Site 5	Site 7
Scale House, Equip. Bldg. & Pers. Facilities (3)	$30,000	$30,000	$30,000
Scales (3)	18,000	18,000	9,000
Scale Equipment (3)	10,000	10,000	10,000
Watermain 7000'	10,000	15,000	10,000
Perimeter Fence 48,000'	7,500	10,000	6,500
Entr. Fence 3,000'	2,000	2,000	2,000
Gravel Surf.	5,000	10,000	4,000
Grading	18,000	30,000	15,000
Landscaping	9,000	12,500	8,000
Yard Lighting	4,000	5,000	3,500
Apron Pav't	10,000	10,000	10,000
Miscellaneous	6,000	10,000	4,000
Total	$129,500	$162,500	$112,000

4. Equipment Cost and Distribution

Item	Site 3	Site 5	Site 7
2 Track Loaders	$46,000	$70,500	$27,500
1 Compactor	-	74,000	-
2 Dozers	$50,000	-	35,000
1 Grader	7,500	12,500	5,000
2 Water Trucks	4,000	8,000	4,000
1 Tractor Mower	600	1,000	400
3 Pickup Trucks	4,000	4,000	4,000
1 Lowboy Trailer	2,000	3,000	1,500
1 Dump Truck	3,500	6,000	2,500
Miscellaneous	2,500	4,000	1,500
1 Dozer (Spare)	10,000	18,000	7,000
1 Wheel Loader (Spare)	12,000	21,000	9,000
	$142,100	$222,000	$97,900

Total Equipment Cost $462,000

5. Equipment Hours Per Year

Item	Site 3	Site 5	Site 7
Track Loader, 170 FWHP	2,496	-	-
Track Loader, 275 FWHP	-	3,744	-
Track Loader, 115 FWHP	-	-	2,496
Compactor, 400 FWHP	-	2,496	-
Dozer, 180 FWHP	2,496	-	-
Dozer, 125 FWHP	-	-	2,496
Grader, 125 FWHP	640	1,040	400
Water Trucks	748	1,248	500
Tractor Mower	320	520	200
Lowboy Trailer	(30)	(50)	(20)
Dump Truck	(30)	(50)	(20)
Spare Equipment			
Dozer, 125 FWHP	(60)	(100)	(40)
Wheel Loader, 130 FWHP	(60)	(100)	(40)
	6,880	9,348	6,212

6. Annual Equipment Operator Hours

	Site 3	Site 5	Site 7
	6,700	9,048	6,092

7. Labor Hours Per Year

Type	Site 3	Site 5	Site 7	Total
Equip. Operator	6,700	9,048	6,092	21,840
Laborers	4,160	8,320	2,704	15,184
Foremen	2,496	2,496	2,496	7,488
Gatekeepers	3,744	3,744	3,744	11,232

EXHIBIT III - 5
COST ESTIMATE - SOLID WASTE DISPOSAL FACILITIES
SANITARY LANDFILL SITES 3 and 5

BASIC COST DATA

1. Land Costs

N.W. Site (3)	400A × 1200/A = $480,000	
S.E. Site (5)	520A × 1000/A = 520,000	
	920 Acres	$1,000,000

2. Initial Site Development (2 sites)

Scale House	2 × 30,000 =	$60,000	
Scales	4 × 9,000 =	36,000	
Scale Equipment	2 × 10,300 =	20,300	
Equipment Bldg. & Pers. Facilities	2 × 30,000 =	60,000	
Watermain 8" x 6000'		30,000	
Perim. Fence 35,000'		18,000	
Entr. Fence 2,000'		4,000	
Gravel Surfacing		30,000	
Grading		60,000	
Landscaping		25,000	
Yard Lighting		10,000	
Apron Pavement		10,000	
Miscellaneous		17,000	$ 380,000

3. Annual Maintenance & Site Development @ $30,000 each — $ 60,000

4. Equipment Purchase

Cost of New Equipment, One Time Purchase Only — $ 443,000

5. Equipment Maintenance, Operation, and Amortization

	Hrs./Yr.	Rate/Hr.	Cost/Yr.	
2 - Track Loaders, 275FWHP	7488	$15.00	$112,300	
2 - Compactors, 400FWHP	4992	19.00	95,000	
1 - Grader, 125FWHP	2080	5.50	11,400	
2 - Water Trucks	2496	4.00	10,000	
1 - Tractor Mower	1040	2.00	2,100	
2 - Pickup Trucks	--	--	2,000	
1 - Lowboy Trailer	(100)	3.00	300	
1 - Dump Truck	(100)	5.00	500	
Miscellaneous	--	--	5,200	
1 - Dozer, 125FWHP (Spare)	(200)	9.00	1,800	
1 - Wheel Loader, 130FWHP (Spare)	(200)	7.00	1,400	
	18,696			$ 242,000

6. Labor

	Hrs./Yr.	Rate/Hr.	Cost/Yr.	
Equipment Operators	18,096	$ 4.25	$76,900	
Laborers 4/Site	16,640	3.25	54,100	
Foremen 1/Site	4,992	4.75	23,700	
Gatekeeper	7,488	3.75	28,100	
				$ 182,800

7. Headquarters & Maintenance Building

Office and Maintenance Bldg.	$80,000	
Office and Maintenance Equip.	50,000	$ 130,000

8. Agency Operations

Salaries	$51,000	
Overhead	14,000	
		$ 65,000

9. Agency Misc. Expense & Contingencies — $ 60,000

ANNUAL COSTS

1. One-Time Expense (CRF-6%-20Yr. = 0.08718)

Land Cost	$1,000,000	
Initial Site Development	380,000	
Equipment Purchase	443,000	
Hdqts. Bldg.	130,000	
.08718 ×	1,953,000 =	$ 170,000

2. Reoccurring Annual Expense

Site Maintenance & Development	$ 60,000	
Equipment M.O. & A.	242,000	
Labor	182,800	
Agency Operation	65,000	
Misc. & Contingency	60,000	$ 609,800

3. Total Annual Costs $ 780,100

FIXED & VARIABLE ANNUAL COSTS

	Fixed Costs	Variable Costs
Debt Expense	$170,000	--
Annual Development	--	$60,000
Equipment M.O.& A.	7,200	234,800
Labor	105,900	76,900
Agency Operation	65,000	--
Misc. & Contingency	--	60,000
	$348,400	$431,700

QUANTITIES FOR UNIT AND TOTAL COSTS

		Ac. Ft.	Tons
1.	1st Yr. 1970	604	723,000
2.	4th Yr. 1973	559	666,000
3.	Avg. Yr. 1982	718	853,000
4.	Final Yr. 1995	949	1,124,000

UNIT AND TOTAL COSTS OF OPERATION

1. 1st Yr. 1970 604 Ac. Ft. 723,000 Tons

Fixed Cost $348,400 ÷ 604 Ac/Ft. = $575/Ac-Ft.
Variable Cost $431,700 ÷ 604 Ac/Ft. = 715/Ac-Ft.
$780,1000 $1,290/Ac-Ft.
$780,100 ÷ 723,000 Tons = $1,08/Ton

2. 4th Yr. 1973 559 Ac. Ft. 666,000 Tons

Fixed Cost $348,400
Variable Cost
559 Ac-Ft. × $715/Ac-Ft. = 399,700
$748,100
$748,100 ÷ 559 Ac. Ft. = $1,340/Ac. Ft.
$748,100 ÷ 666,000 Tons = $1.12/Ton

3. Avg. Yr. 1982 718 Ac. Ft. 853,000 Tons

Fixed Cost $348,400
Variable Cost
718 Ac-Ft. × $715/Ac-Ft. 513,400
$861,800
$861,800 ÷ 718 Ac-Ft. = $1,200 Ac-Ft.
$661,800 ÷ 853,000 Tons = $1.01/Ton

4. Final Year 1995 949 Ac. Ft. 1,124,000 Tons

Fixed Cost $348,400
Variable Cost
949 Ac-Ft × $715/Ac-Ft. 678,500
$1,026,900

$1,026,900 ÷ 949 Ac-Ft. = $1,080/Ac. Ft.
$1,026,900 ÷ 1,124,000 = $0.92/Ton

BOND DEBT SERVICE RESERVE

0.4 (170,300) = $68,100

1. 1st Yr. 1970 $68,100 ÷ 723,000 Tons = $0.10/Ton
2. 4th Yr. 1973 68,100 ÷ 666,000 Tons = $0.10/Ton
3. Avg. Yr. 1982 68,100 ÷ 853,000 Tons = $0.08/Ton
4. Final Yr. 1995 68,100 ÷ 1,124,000 Tons = $0.06/Ton

SUMMARY OF UNIT COSTS

Year	Operation Cost $/Ton	Debt Service Reserve Cost $/Ton	Total Unit Cost $/Ton
1970	$1.08	$0.10	$1.18
1973	$1.12	$0.10	$1.22
1982	$1.01	$0.08	$1.09
1995	$0.92	$0.06	$0.98

Exhibit III-5, Page 2

INDIVIDUAL SITE DATA

1. Refuse Accumulation & Land Requirements
1970 1st Year of Operation

	Ac-Ft.*	Fill Depth	Fill Area	x1.2	Purchase Area
Site 3	9380	30'	313 Ac	376 Ac	400 Ac
Site 5	9830	24'	410 Ac	492 Ac	520 Ac
Totals	13,210				920 Ac

*Compacted and Seasonally Adjusted

2. Tons of Refuse Per Day, 1970/1995

Site	Operation, Days/Week	Tons Per Day**
3	6	1100/1840
5	6	1220/1760

** Seasonally Adjusted

3. Equipment Cost and Distribution

Item	Site 3	Site 5
2 Track Loaders, 275 FWHP	$70,000	$70,000
2 Compactors, 400 FWHP	74,000	74,000
1 Grader, 125 FWHP	12,500	12,500
2 Water Trucks	8,000	8,000
1 Tractor/Mower	1,000	1,000
2 Pickup Trucks	4,000	4,000
1 Lowboy Trailer	3,500	3,500
1 Dump Truck	6,000	6,000
Miscellaneous	4,000	4,000
1 Dozer, 125FWHP (Spare)	17,500	17,500
1 Wheel Loader, 130FWHP (Spare)	21,000	21,000
	$221,500	$221,500

Total Equipment Cost $443,000

4. Equipment Hours Per Year

Item	Site 3	Site 5
Track Loader, 275FWHP	3744	3744
Compactor, 400FWHP	2496	2496
Grader, 125FWHP	1040	1040
Water Truck	1248	1248
Tractor/Mower	520	520
Trailer	(50)	(50)
Dump Truck	(50)	(50)
Dozer, 125FWHP (Spare)	(100)	(100)
Wheel Loader, 130FWHP (Spare)	(100)	(100)
	9348	9348

5. Annual Equipment Operator Hours
9048 Hours Each Site

6. Labor Hours Per Year

Type	Site 3	Site 5	Total
Equip. Operators	9,098	9,098	18,196
Laborers, 4/Site	8,320	8,320	16,640
Foreman	2,496	2,496	4,992
Gatekeeper	3,744	3,744	7,488

EXHIBIT III - 6
COST ESTIMATE - SOLID WASTE DISPOSAL FACILITIES
SANITARY LANDFILL SITES 3, 5, and 7

BASIC COST DATA

1. Land Cost

S.W. Site (1)	80 A @ 1,200.00/A =	$ 96,000	
N.W. Site (3)	320 A @ 1,200.00/A =	384,000	
S.E. Site (5)	480 A @ 1,000.00/A =	480,000	
	880 Ac.		$960,000

2. Initial Site Development

S.W. Site (1)	$ 66,500	
N.W. Site (3)	133,500	
S.E. Site (5)	162,500	
		$362,500

3. Annual Maintenance & Site Development

S.W. Site (1)	$ 10,000	
N.W. Site (3)	25,000	
S.E. Site (5)	30,000	
		$ 65,000

4. Equipment Purchase

Cost of New Equipment, One Time Purchase Only.	$494,000

5. Equipment Maintenance, Operation, and Amortization

Item	Hrs/Yr.	Rate/Hr.	Cost/Yr.	
Track Loader	2,080	$10.00	$ 20,800	
Track Loaders	7,488	15.00	112,300	
Compacters	4,992	19.00	94,800	
Grader	2,080	5.50	11,400	
Water Trucks	2,496	4.00	10,000	
Tractor/Mower	1,040	2.00	2,100	
Lowboy Trailer	(100)	3.00	300	
Dump Truck	(100)	5.00	500	
Pickup Trucks	-	-	3,000	
Miscellaneous	-	-	8,400	
Dozer (Spare)	(200)	9.00	1,800	
Wheel Loader (Spare)	(200)	7.00	1,400	
	20,776			$266,800

6. Labor

Item	Hrs/Yr. Total	Rate/Hr.	Cost/Yr.	
Equip. Operators	20,176	$4.25	85,700	
Laborers	14,560	3.25	47,300	
Foremen	4,992	4.75	23,700	
Gatekeepers	9,568	3.75	35,900	
				$192,600

7. System Hdqtrs. & Maintenance Bldg.

Office & Maint. Bldg.	$80,000	
Office & Maint. Equip.	50,000	
		$130,000

8. Agency Operation

Salaries	$51,000	
Overhead	14,000	
		$ 65,000

9. Miscellaneous Expense & Contingency

Miscellaneous Expense & Contingency	$ 60,000

ANNUAL COST DATA

1. One-Time Expense (crf-6% - 20 Yr. = 0.08718)

Land Cost		$960,000		
Initial Site Development		362,500		
Equipment Purchase		494,000		
Hdqtrs. Bldg.		130,000		
	08718 ×	$1,946,500	=	$163,700

2. Operating Expense

Site Maint & Development	$ 65,000	
Equip. M.O. & A	266,800	
Labor	192,600	
Agency Operation	65,000	
Misc. & Contingency	60,000	
		$649,400

3. Total Annual Cost $819,100

FIXED AND VARIABLE ANNUAL COSTS

	Fixed Costs	Variable Costs
Debt Expense	$169,700	-
Annual Development	-	$ 65,000
Equip. M. O. & A.	11,400	255,400
Labor	106,900	85,700
Agency Operation	65,000	-
Misc. & Contingency	-	60,000
	$353,000	$466,100

QUANTITIES FOR UNIT AND TOTAL COSTS

	Ac.-Ft.	Tons
1st Yr., 1970	604	723,000
4th Yr., 1973	559	666,000

UNIT AND TOTAL COST OF OPERATION

1. 1st Yr. 1970 604 Ac. Ft. 723,000 Tons
Fixed Cost $353,000 ÷ 604 Ac. Ft. = $585/Ac. Ft.
Variable Cost 466,100 - 604 Ac. Ft. = $770/Ac. Ft.
$819,100 $1,355 Ac. Ft.

$819,100 - 723,000 Tons = $1.13/Ton

2. 4th Yr., 1973 559 Ac. Ft. 666,000 Tons
Fixed Cost $353,000
Variable Cost 559 Ac. Ft. x $770/Ac. Ft. = 430,400
$783,400

$783,400 - 559 Ac. Ft. = $1,400/Ac. Ft.
$783,400 - 666,000 Tons = $1.18/Ton

BOND DEBT SERVICE RESERVE

0.4 (169,700)
1. 1st Yr., 1970 $67,900 - 723,000 Tons = $0.10/Ton
2. 4th Yr., 1973 $67,900 - 666,000 Tons = $0.11/Ton

SUMMARY OF UNIT COSTS

Year	Operation Cost $ Ton	Debt Service Reserve Cost $/Ton	Total Unit Cost $/Ton
1970	$1.13	$0.10	$1.23
1973	$1.18	$0.11	$1.29

INDIVIDUAL SITE DATA

1. Refuse Accumulation and Land Requirements
1970 - 1st Year of Operation

	Ac.-Ft.	Fill Depth	Fill Area	x1.2	Purchase Area
Site 1	1800	30'	60 Ac.	72 Ac.	80 Ac.
Site 3	7630	30'	254 Ac.	305 Ac.	320 Ac.
Site 5	9780	24'	407 Ac.	489 Ac.	480 Ac.
Totals	19,210				880 Ac.

2. Tons of Refuse per Day, 1970/1995

	Operation, Days/Week	Tons Per Day
Site 1	5	220/480
Site 3	6	920/1440
Site 5	[illegible]	1210/1760

3. Initial Site Development and Costs

	Site 1	Site 3	Site 5
Scale House, Equip. Bldg. & Pers. Facilities	$20,000	$30,000	$30,000
Scales	--	18,000	18,000
Scale Equip.	--	10,000	10,000
Watermain 7000'	10,000	10,000	15,000
Perim. Fence 42,000'	3,500	7,500	10,000
Entr. Fence 3,000'	2,000	2,000	2,000
Gravel	2,000	6,000	10,000
Grading	8,000	20,000	30,000
Landscaping	6,000	10,000	12,500
Yard Lighting	2,000	4,000	5,000
Apron Pavement	10,000	10,000	10,000
Miscellaneous	3,000	6,000	10,000
	$66,500	$133,500	$162,500

4. Equipment Cost and Distribution

Item	Site 1	Site 3	Site 5
3 Track Loaders	$46,000	$70,000	$70,000
2 Compacters	--	74,000	74,000
1 Grader	2,500	10,000	12,500
2 Water Trucks	1,500	6,500	8,000
1 Tractor/Mower	200	800	1,000
3 Pickup Trucks	4,000	4,000	4,000
1 Lowboy Trailer	1,000	2,500	3,500
1 Dump Truck	1,000	5,000	6,000
Miscellaneous	800	3,200	4,000
1 Dozer (Spare)	3,400	14,600	18,000
1 Wheel Loader (Spare)	5,000	16,000	21,000
	$65,400	$206,600	$222,000

Total Equipment Cost $494,000

5. Equipment Hours per Year

Item	Site 1	Site 3	Site 5	
Track Loader, 170FWHP	2,080	--	--	
Track Loader, 275FWHP	--	3,744	--	
Track Loader, 275FWHP	--	--	3,744	
Compacters, 400FWHP	--	2,496	2,496	
Grader, 120FWHP	240	800	1,040	
Water Trucks	248	1,000	1,248	
Tractor/Mower	120	400	520	
Lowboy Trailer	(10)	(40)	(50)	
Dump Truck	(10)	(40)	(50)	
Dozer, 125 FWHF (Spare)	(20)	(80)	(100)	
Wheel Loader, 130FWHF (Spare)	(20)	(80)	(100)	
	2,748	8,680	9,348	20,776

6. Annual Operator Hours

2,688	8,440	9,048	20,176

7. Labor Hours per Year

	Site 1	Site 3	Site 5	Total
Equip. Operator	2,688	8,440	9,048	20,176
Laborers	--	6,240	8,320	14,560
Foremen	--	2,406	2,406	4,992
Gatekeepers	2,080	3,744	3,744	9,568

EXHIBIT III - 7
COST ESTIMATE - SOLID WASTE DISPOSAL FACILITIES
SANITARY LANDFILL SITES 1, 3, 5, and 7

BASIC COST DATA

1. Land Costs

S.W. Site (1)	80 Ac. @	$1200/Ac. =	$ 96,000	
N.W. Site (3)	200 Ac. @	1200/Ac. =	240,000	
S.E. Site (5)	480 Ac. @	1000/Ac. =	480,000	
N.E. Site (7)	160 Ac. @	1000/Ac. =	160,000	
	920 Ac.			$976,000

2. Initial Site Development

S.W. Site (1)	$ 66,500	
N.W. Site (3)	122,000	
S.E. Site (5)	162,000	
N.E. Site (7)	112,000	
		$453,000

3. Annual Maintenance and Site Development

S.W. Site (1)	$ 10,000	
N.W. Site (3)	20,000	
S.E. Site (5)	30,000	
N.E. Site (7)	20,000	
		$ 80,000

4. Equipment Purchase, One-Time Purchase Only — $475,000

5. Equipment Maintenance, Operation & Amortization

Item	Hrs/Yr.	Rate/Hr.	Cost/Yr.	
Track Loader	2,080	$10.00	$20,000	
Track Loader	2,456	15.00	37,400	
Dozers	7,488	9.00	67,400	
Scrapers	(2,496)	3.00	7,500	
Compactor	2,496	19.00	47,400	
Grader	2,496	5.50	14,800	
Water Trucks	2,406	4.00	10,000	
Tractor Mower	1,248	2.00	2,500	
Trailer	(100)	3.00	300	
Dump Truck	(200)	5.00	1,000	
Pickup Trucks	--	--	4,000	
Miscellaneous	--	--	11,000	
Dozer (Spare	(200)	9.00	1,800	
Wheel Loader (Spare)	(200)	7.00	1,400	
	20,800			$227,300

6. Labor

Type	Hrs/Yr.	Rate/Hr.	Cost/Yr.	
Equip. Operators	20,800	$ 4.25	$88,400	
Laborers	16,640	3.25	54,100	
Foremen	7,488	4.75	35,600	
Gatekeepers	13,312	3.75	49,900	
				$228,000

7. Headquarters and Maintenance Bldg.

Office & Maintenance Building	$80,000	
Office & Maintenance Equipment	50,000	
		$130,000

8. Agency Operation

Salaries	$51,000	
Overhead	14,000	
		$ 65,000

9. Miscellaneous Expense and Contingencies — $ 60,000

ANNUAL COST DATA

1.	One-Time Expense (crf-6%-20 Yr. = 0.98718)				
	Land Cost			$976,000	
	Initial Site Development			453,000	
	Equipment Purchase			475,000	
	Headquarters Bldg.			130,000	
		.08718	x	$2,034,000	$177,300
2.	Reoccurring Annual Expense				
	Site Maint. & Development			$ 80,000	
	Equip. M.O. & A.			277,300	
	Labor			228,000	
	Agency Operation			65,000	
	Misc. & Contingency			60,000	
					$660,300
3.	Total Annual Cost				$837,600

FIXED AND VARIABLE ANNUAL COSTS

	Fixed Costs	Variable Costs
Debt Expense	$177,300	--
Annual Development	--	$ 80,000
Equip. M.O. & A.	18,200	209,100
Labor	139,600	88,400
System Operation	65,000	--
Misc. & Contingency	--	60,000
	$400,000	$437,500

QUANTITIES FOR UNIT AND TOTAL COSTS

	Ac.-Ft.	Tons
1st Yr., 1970	604	723,000
4th Yr., 1973	559	666,000

UNIT AND TOTAL COSTS

1st Yr., 1970	604 Ac.Ft.	723,000 Tons	
Fixed Cost	$400,100 - 604 Ac.Ft.		$660/Ac.Ft.
Variable Cost	437,500 - 604 Ac. Ft.		725/Ac.Ft.
	$837,600		$1,385/Ac.Ft.
4th Yr., 1973	559 Ac. Ft.	666,000 Tons	
Fixed Cost			$400,100
Variable Cost	559 Ac.Ft. x $725/Ac.Ft.		405,300
			$805,400

$805,400 - 559 Ac.Ft.	$1,440/Ac.Ft.
$805,400 - 666,000 Tons	$1.21/Ton

BOND DEBT SERVICE RESERVE

0.40 ($177,300)

1st Yr., 1970	$71,000 - 723,000 Tons	$0.10/Ton
4th Yr., 1973	$71,000 - 666,000 Tons	$0.11/Ton

SUMMARY OF UNIT COSTS

Year	Operation Cost $/Ton	Debt Service Reserve Cost $/Ton	Total Unit Cost $/Ton
1970	$1.16	$0.10	$1.26
1973	1.21	0.11	1.32

INDIVIDUAL SITE DATA

1. Refuse Accumulation and Land Requirements
1970 - 1st Yr. of Operation

	Ac.-Ft.*	Fill Depth	Fill Area	x1.2	Purchase Area
Site 1	1800	30'	60 Ac.	72 Ac.	80 Ac.
Site 3	4350	30'	145 Ac.	174 Ac.	200 Ac.
Site 5	9770	24'	407 Ac.	489 Ac.	480 Ac.
Site 7	3290	24'	137 Ac.	165 Ac.	160 Ac.
Totals	19,210				920 Ac.

*Compacted and Seasonally Adjusted

2. Tons of Refuse Per Day, 1970/1995

	Operation, Days/Week	Tons Per Day**
Site 1	5	220/480
Site 3	6	510/850
Site 5	6	1210/1750
Site 7	6	410/580

**Seasonally Adjusted

3. Initial Site Development and Costs

Item	Site 1	Site 3	Site 5	Site 7
Scale House, Equip. Bldg. & Pers. Facilities	$20,000	$30,000	$30,000	$30,000
Scales	--	9,000	18,000	9,000
Scale Equip.	--	10,000	10,000	10,000
Watermain	10,000	10,000	15,000	10,000
Perim. Fence	3,500	6,500	10,000	6,500
Entr. Fence	2,000	2,000	2,000	2,000
Gravel Surfacing	2,000	4,000	10,000	4,000
Grading	8,000	15,000	30,000	15,000
Landscaping	6,000	8,000	12,500	8,000
Area Lighting	2,000	3,500	5,000	3,500
Apron Pavement	10,000	10,000	10,000	10,000
Miscellaneous	3,000	4,000	10,000	4,000
	$66,500	$112,000	$162,500	$112,000

4. Equipment Cost and Distribution

Item	Site 1	Site 3	Site 5	Site 7
2 Track Loaders	$46,000	--	$70,000	--
2 Dozers	--	$35,000	--	$35,000
2 Scrapers	--	25,000	--	25,000
1 Compacter	--	--	74,000	--
1 Grader	2,500	5,000	12,500	5,000
2 Water Trucks	--	4,000	8,000	4,000
1 Tractor Mower	200	400	1,000	400
4 Pickup Trucks	4,000	4,000	4,000	4,000
1 Lowboy Trailer	1,750	1,750	1,750	1,750
1 Dump Truck	3,000	3,000	3,000	3,000
Miscellaneous	1,600	2,200	4,000	2,200
1 Dozer (Spare)	8,750	8,750	8,750	8,750
1 Wheel Loader (Spare)	10,500	10,500	10,500	10,500
	$78,300	$99,600	$197,500	$99,600

Total Equipment Cost $475,000

5. Equipment Hours per Year

Item	Site 1	Site 3	Site 5	Site 7
Track Loader, 170FWHP	2,080	--	--	--
Track Loader, 275FWHP	--	--	2,496	--
Dozer, 125FWHP	--	3,744	--	3,744
Scraper, 18/26 C.Y.	--	(1,248)	--	(1,248)
Compacter, 400FWHP	--	--	2,496	--
Grader, 125FWHP	248	500	1,248	500
Water Truck	--	624	1,248	624
Tractor Mower	124	250	624	250
Trailer	(25)	(25)	(25)	(25)
Dump Truck	(50)	(50)	(50)	(50)
Dozer, 125FWHP (Spare)	(50)	(50)	(50)	(50)
Wheel Loader, 130FWHP (Spare)	(50)	(50)	(50)	(50)
	2,627	6,541	8,287	6,541

6. Annual Equipment Operator Hours

	Site 1	Site 3	Site 5	Site 7
	2,452	5,118	8,112	5,118

7. Labor Hours Per Year

Type	Site 1	Site 3	Site 5	Site 7	Total
Equip. Operators	2,452	5,118	8,112	5,118	20,800
Laborers		4,160	8,320	4,160	16,640
Foremen		2,496	2,496	2,496	7,488
Gatekeeper	2,080	3,744	3,744	3,744	13,312

EXHIBIT III - 8
COST ESTIMATE - SOLID WASTE DISPOSAL FACILITY
E. POTTAWATTAMIE CO. LANDFILL SITE NO. 8

BASIC COST DATA

1. Land Cost

E. Pottawattamie Co. Site (8) 40 Ac. @ $500/Ac.		$20,000

2. Initial Site Development

Equip. Bldg. & Pers. Facilities	$10,000	
Watermain 1000'	5,000	
Perim. Fence 4500'	2,300	
Entr. Fence 800'	1,600	
Gravel Surfacing	900	
Grading	3,000	
Landscaping	2,000	
Yard Lighting	1,000	
Apron Pavement	2,000	
Miscellaneous	1,200	$29,000

3. Annual Site Maintenance & Development

		$ 1,500

4. Equipment Purchase

1 Track Loader	$28,000	
1 Pickup Truck	4,000	
Miscellaneous	1,000	$33,000

5. Equipment Maintenance, Operation and Amortization

Item	Hrs/Yr.	Rate/Hr.	Cost/Yr.	
Loader, 115FWHP	1,560	$7.00	$10,900	
Grader, 125FWHP	200	5.50	1,100	
Mower	100	2.00	200	
Pickup Truck			1,000	
Miscellaneous			200	
				$13,400

6. Labor

Full Time	2,080 Hr. @ 4.25 =	$8,800	
Part Time	300 Hr. @ 4.25 =	1,300	$10,100

7. Agency Hdqtrs. & Maint. Bldg.

(130,000 x .08718 = 11,350)

$\frac{28,200}{723,000} \times 11,350 =$ 400 $ 400

8. Agency Operations

$\frac{28,200}{723,000}$ (65,000) = $ 2,600

9. Miscellaneous & Contingency

$ 2,000

ANNUAL COSTS

1. One-Time Expense
(crf-6%-20 Yr.) = .08718

Land Cost			$20,000		
Initial Site Development			29,000		
Equip. Purchase			33,000		
	.08718	x	82,000	=	$ 7,200

2. Reoccurring Annual Expense

Site Maintenance & Development	$ 1,500	
Equip. M.O. & A.	13,400	
Labor	10,100	
Hdqtrs. Bldg.	400	
Agency Operation	2,600	
Miscellaneous & Contingency	2,000	
		$30,000

3. Total Annual Costs $37,200

FIXED & VARIABLE ANNUAL COSTS

	Fixed Costs	Variable Costs
One-Time Expense	$7,200	--
Annual Development	--	$ 1,500
Equip. M.O. & A.	2,500	10,900
Labor	1,300	8,800
Hdqtrs. Bldg.	400	--
Agency Operation	2,600	--
Miscellaneous & Contingency	--	2,000
	$14,000	$23,200

QUANTITIES FOR UNIT AND TOTAL COSTS

	Ac.-Ft.	Tons
1st Yr., 1970	23.5	28,200
4th Yr., 1973	21.0	25,000

UNIT AND TOTAL COSTS

1. 1st Yr., 1970 23.5 Ac. Ft. 28,200 Tons
Fixed Cost $14,000 - 23.5 Ac. Ft. = $595/Ac. Ft.
Variable Cost 23,200 - 23.5 Ac. Ft. = 990/Ac. Ft.
$37,200 $1,585/Ac Ft

$38,200 ÷ 28,200 Ton = $1.36/Ton

2. 4th Yr., 1973 21 Ac. Ft. 25,000 Tons
Fixed Cost $14,000
Variable Cost 21 Ac. Ft. x $990/Ac. Ft. 20,800
$34,800

$34,800 ÷ 21 Ac. Ft. = $1,660/Ac. Ft.
34,000 ÷ 25,000 Ton = $1.39/Ton

BOND DEBT SERVICE RESERVE

0.4 (7200) = $1800
1st Yr. 1,800 ÷ 28,200 Ton = $0.07/Ton
4th Yr. 1,800 ÷ 25,000 Ton = $0.08/Ton

SUMMARY OF UNIT COSTS

Year	Operation Cost $/Ton	Debt Service Reserve Cost $/Ton	Total Unit Cost $/Ton
1970	$1.36	$0.07	$1.43
1973	1.39	0.08	1.47

EXHIBIT IV -1 METHODS OF DETERMINING A FEE FOR REFUSE DISPOSAL

There are four methods, in common usage, that are used to determine the fees collected for the use of disposal sites. Each method is basically an approach to measuring the quantity of waste as delivered to the landfill site, so that a fee schedule may be adopted which will produce sufficient revenue to support the disposal operation. The four methods include:

1. Fees based on tonnage of actual waste;
2. Fees based on the gross vehicle weight;
3. Fees based on the gross volume of the hauling vehicle;
4. Fees based on the volume of actual waste.

All of these methods have advantages and disadvantages. The tonnage basis is recommended as being the fairest, most accurate and most practical to operate.

This method has the greatest initial cost because a scale house and scales must be installed. This cost has been estimated and is included in the landfill site development costs presented in Part Three.

Each vehicle is weighed upon entering the site and the gross weight of the vehicle and load is automatically recorded on the scale mechanism and on a weight ticket. Upon exiting the site, the empty or tare weight of the vehicle is recorded, on the weigh ticket, the net weight of the refuse and the fee is determined and recorded on the ticket automatically. The driver then pays the fee with a credit card, or uses prepaid coupons or may pay in cash.

This method is accurate and convenient, and removes any individual judgment determination by employees or drivers. In addition, an efficient method of record keeping and billing is built into the system. The fee based on tonnage of actual waste is also reasonably fair. Where there is a inequity in the fee based on tonnage, either for the waste producer or the disposal facility operator, a special fee may be determined for the class of material involved. The rate setting authority should be empowered to adjust rates as required.

Determining the fee by gross vehicle weight or by gross volume of vehicle are both similar in procedure and method. They have the advantage of not requiring any initial investment. The inequities in these methods are great. As often as not, the weight or capacity of the vehicle has no bearing on the actual amount of refuse hauled in the vehicle. Customers carrying small or partial loads are penalized while those who overload their vehicles receive a premium. In order to keep customer dissatisfaction to a minimum, a great deal of individual spot adjustments and determinations must be made by the landfill attendant. This leads to a general breakdown of cost and scheduling procedures. These methods are considered satisfactory on an interim or short time basis, where it would not be practical or economical to install scales.

The method of determining fees by actual volume of the waste is essentially a fair method, similar to the tonnage system, but it too has possibilities of inequities. The volume occupied by a given quantity of waste will vary with the type of material and how it is precompacted or loaded. This method has the advantage of not requiring scales and would be suitable at a location too small to afford the expense of scales or for a temporary fee system.

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